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JOURNAL OF THE PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

Letter from M. E. Bourgeau, Botanist to Capt. Palliser's British North American Exploring Expedition. Addressed to Sir W. J. Hooker, F.R.S., F.L.S., and communicated by him.

[Read March 3rd, 1859.]

Fort Garry, Saskatchewan,
June 7th, 1858.

Sir,—As you received the first letter, sent from Fort Garry, I need not detain you with a description of the little collection I was enabled to make, while almost daily upon the rivers and lakes, hemmed in on all sides by dense forests, to the Fort just named.

I commenced my herborizations June 12th, upon the Ile Royale, situated on Lake Superior, where the vegetation had hardly commenced. The Alders and Willows were in flower on the banks of the island, and by their sides large banks of ice still existed under the rocks. This island is thoroughly wooded, and especially with two *Abies* (*alba* and *balsamifera*), *Betula papyracea*, and the *Thuya*. The same day we landed at the entrance of the Kaministoquoiah River, Fort William; but the shortness of the stay did not enable me to make excursions in that place. From that time it was only during the hours of rest and at the portages that I could gather a few specimens; the indifferent accommodation in our boat did not permit of a large collection being made, from the difficulty of preserving it from damp. I have been delighted to learn that you have received the plants in a good state of preservation, and I hope that this year also you will receive a pretty large quantity, and a good number of each species.

As you are geographically acquainted with the route of the expedition, I need not speak concerning the localities through which we have passed; the specimens of plants (none neglected, but many repeated) will prove a better botanical journal of the expedition than all the notes which I might send you from here; nevertheless I have preserved some notes upon the particular places which are woody, if it is important to know them. There is one particular with which it is as well you should be acquainted —it is the geographical extent of the plants in the countries through which we have travelled; that is to say, the same species occupies a surface from 300 to 400 leagues. The prairies are well covered with plants, of the *Gramineæ* and *Cyperaceæ* in abundance, but of few species. Three distinct localities are to be met with in these prairies—the ordinary plains, marshes and streamlets, and dry rising grounds. Each of these three localities has its peculiar vegetation; but let each locality occur where it will, it presents the same plants throughout. The greater part of the plants at Fort Garry and Pembina are the same as those of Carlton; and it is my conviction that they extend close to the mountains. My collections of 1857, and a portion of those of 1858, you will receive this year; and I give you here the number of boxes which are addressed to you—two from Fort Ellice, containing the collections from Pembina, and some parcels of seeds. This collection is superb, and contains the plants gathered at the most southerly part of our voyage—viz. from the great prairie of the Tortue Mountain, and in the neighbourhood of the river at Souris, to Fort Ellice, where I remained some time, and was consequently able to make a careful collection of the *Compositæ*, which are in perfection from August 15th till the close of the season.

From Fort Ellice our route lay direct to Saskatchewan, the greater part of which is what we in Europe would call pasturage. It is indeed pasture-land, covered with buffaloes, and the grass being so constantly browsed does not attain any height. The country also seems very dry: there are some lakes, but few marshes. There are no forests; but, beside some streamlets, a few small copses of *Populus tremuloides*, which appear to have been spared from fires. The borders also of the Saskatchewan river at l'Elbow are wooded in some places with *P. balsamifera*, *grandidentata*, *tremuloides*, *Fraxinus*, and *Betula pumila*. In the marshy localities, tufted Willows, interspersed with other shrubs, constitute a covert for deer, and specially for the bear, whose principal food, during the month of September, is the fruit of such shrubs as the *Shepherdia argentea*, which I have seen in large quantities in his stomach.

We arrived at Carlton on the 8th October, and there I finished putting in order my last collections, containing a quantity of seeds, besides the botanical specimens, and filling in all one case. There are 166 packets of different seeds, several shells, and some insects, which I beg you will keep until I return, to make the catalogue. Of this spring's collections, I send two cases—one containing the botanical packets, and the other some objects for your Economical Museum; and several diseases of plants, occasioned by the punctures of insects, for Dr. Hooker. In one of the boxes you will find some animals' skins and birds' eggs, which also I beg you will take care of till my return: each article is furnished with a ticket. As the news I looked for by the arrival of the Captain did not come, I shall be obliged to pass another winter at Edmonton, and I trust, by the following spring, to be enabled to visit those parts of the Rocky Mountains lying nearest this locality; and thus I shall have all the spring plants, which by arriving too late this season I run the chance of losing. It is well known that August is the most suitable month for traversing the mountains; and, besides, the *Compositæ* and seeds of many plants are not perfect till that season.

The total number of cases which you will receive in 1858 is—2 from Fort Ellice, and 3 from Carlton, making 5 in all.

I am anxious to reach the mountains as soon as possible. It is now two seasons since I saw any mountains resembling the Alpine chains of my native country.

Dr. Hooker, to whom I desire my respectful remembrances, will receive at the same time all the observations which I have taken since I left Carlton. I have a journal, in which I have notes upon the temperature of the trees, upon the weather, and on various circumstances; and, lastly, upon the vegetation, and specially upon a certain tree, which puts forth its leaves a month later, which I should like to know the cause of. I desire to do my utmost in rendering the voyage as useful to science as possible.

Accept, sir, every assurance of esteem from your humble servant,

E. Bourgeau.

I have given special attention to the collection of *Salices* made at Carlton: the species are not numerous, for which reason I have collected both male and female specimens of each plant, and have been careful to put corresponding numbers on each sex. There are a good many duplicates; therefore I trust you may have as many specimens as will enable you to study them satisfactorily. I regret not being able to send you the leaves of the *Salices*; they are not yet developed. During the third week of last month, the catkins of *P. balsamifera* have been frozen and have fallen off; several other plants, also in flower, have been frozen, and thus for a week I have been deprived of my excursions.

Observations referred to in the foregoing Letter, on the Temperature of the Earth and of Forest-trees, made at Fort Carlton, on the Saskatchewan.

Date.	2 feet.	3 feet.	Populus.	Abies.	Atmosphere.
1857.	°	°	°	°	°
Nov. 1	39·0	41·0	....	....	37·5
2	39·0	41·5	....	....	27·0
3	39·0	41·5	....	....	36·0
4	39·0	40·5	....	....	....
5	39·0	40·0	....	....	....
6	39·0	40·0	....	....	26·0
7	38·0	39·7	....	....	25·0
8	37·5	39·0	....	....	15·0
9	37·0	39·0	....	....	21·5
10	37·0	39·0	....	....	15·0
11	37·0	39·0	....	....	25·0
12	36·5	38·5	....	....	26·0
13	36·0	38·0	....	....	25·0
14	36·0	38·0	....	....	31·0
15	36·0	38·0	....	....	22·0
16	35·5	37·5	....	....	31·7
17	35·0	37·0	....	....	29·0
18	35·0	37·0	....	....	22·0
19	35·0	37·0	....	....	2·0
20	34·7	36·7	....	....	34·0
21	34·5	36·5	....	....	+ 1·0
22	34·0	36·0	....	....	3·0
23	33·7	36·0	....	....	24·0
24	34·0	36·0	....	....	14·0
25	33·5	35·5	....	....	10·0
26	33·0	35·0	....	....	13·0
27	33·0	35·0	....	....	25·0
28	33·0	35·0	....	....	18·0
29	33·0	35·0	....	....	13·0
30	33·0	35·0	....	....	12·0
Dec. 1	33·0	35·0	....	....	17·0
2	32·5	35·0	17·0	....	13·0
3	32·0	34·0	9·0	....	− 1·0
4	32·0	34·0	7·0	....	10·5
5	32·0	34·0	11·0	....	17·0
6	32·0	34·0	12·0	....	15·0

TABLE (*continued*).

Date.	2 feet.	3 feet.	Populus.	Abies.	Atmosphere.
1857.	°	°	°	°	°
Dec. 7	32·0	34·0	− 1·0	....	−14·6
8	31·5	34·0	+ 7·0	....	+ 4·0
9	31·0	34·0	5·0	....	+ 0·2
10	31·0	34·0	7·0	....	7·0
11	31·0	34·0	7·0	....	6·5
12	31·0	34·0	8·0	....	15·0
13	30·5	33·0	12·0	....	13·0
14	30·5	33·0	5·0	....	− 1·0
15	30·5	33·0	14·0	....	+29·0
16	30·5	33·0	15·2	....	+19·0
17	30·5	33·0	6·5	....	5·0
18	30·0	33·0	10·0	....	10·0
19	30·0	33·0	16·5	....	20·3
20	30·0	32·9	16·0	....	19·8
21	29·2	32·6	11·0	....	14·0
22	29·2	32·6	24·0	23·7	36·0
23	30·0	32·6	16·0	....	10·0
24	29·9	32·0	8·0	24·0	0·0
25	29·2	32·0	3·5	4·0	+11·0
26	29·0	32·0	8·2	9·0	26·5
27	29·0	32·0	6·0	14·0	5·9
28	28·5	32·0	5·0	14·0	10·0
29	28·5	32·0	12·4	8·0	15·0
30	28·0	32·0	10·0	15·0	15·0
31	28·0	32·0	5·0	11·0	− 7·0
1858.					
Jan. 1	28·0	32·0	....	5·5	+2·0
2	28·0	31·7	9·0	8·2	31·7
3	28·0	31·7	28·0	28·0	43·0
4	28·0	31·8	....	22·5	3·0
5	28·0	31·8	7·5	9·0	2·9
6	28·0	31·8	− 9·9	−20·0	−23·0
7	26·5	31·5	− 9·2	−20·0	−12·2
8	25·2	31·5	− 7·5	−12·0	− 3·0
9	24·8	31·0	− 6·0	−15·0	+10·0
10	24·6	31·0	....	+ 4·2	− 0·2
11	24·2	30·5	+ 2·5	....	+ 1·0
12	24·2	30·5	− 8·6	....	−23·0
13	24·2	30·5	−13·2	....	−31·0
14	24·2	30·5	−22·0	....	−17·2
15	24·2	30·0	−13·0	− 25??	−17·0
16	22·5	29·2	− 8·0	....	−31·5
17	22·0	29·2	− 7·0	− 5·0	− 4·3
18	22·0	28·1	+12·2	+ 6·5	+20·5
19	23·0	28·1	....	+12·0	+15·9
20	23·0	28·0	+ 6·0	+ 8·0	+14·5
21	23·0	28·0	4·6	6·0	4·5
22	23·2	28·0	14·0	9·5	7·0
23	23·5	28·0	4·5	5·0	− 2·3
24	23·2	28·0	− 2·0	8·0	− 7·7
25	22·5	27·6	....	....	− 5·2
26	22·0	27·4	4·0	....	− 9·3
27	22·0	27·4	....	....	+ 0·8
28	21·8	27·0	....	....	−13·0
29	21·5	26·2	2·0	−10·0	+ 8·0
30	21·1	26·0	4·0	− 5·5	− 3·0
31	21·0	26·0	16·0	+10·0	+ 8·0

I have made some remarks on the temperature of trees in my journal.

Extremes of Atmospheric Temperature (Maximum and Minimum) for every Twenty-four Hours.

Date.	Max.	Min.	Date.	Max.	Min.	Date.	Max.	Min.
1857.	°	°	1857.	°	°	1858.	°	°
Nov. 12	4·2	30·2	Dec. 9	0·0	6·9	Jan. 4	− 1·0	28·0
13	9·0	27·2	10	−16·7	9·2	5	−14·1	7·0
14	12·8	33·0	11	4·7	16·0	6	13·0	25·0
15	18·0	35·0	12	5·0	33·0	7	−22·9	− 3·1
16	20·8	34·4	13	8·0	27·0	8	−13·0	− 0·2
17	11·2	31·0	14	− 1·5	12·0	9	−10·9	18·9
18	− 4·2	15·0	15	4·0	35·0	10	− 2·1	14·0
19	0·0	14·5	16	− 4·0	24·6	11	−15·0	18·0
20	10·2	41·1	17	−10·0	8·1	12	−34·0	−15·0
21	0·3	6·0	18	0·0	19·6	13	−40·0	−15·0
22	2·0	11·1	19	13·0	26·0	14	−14·0	26·2
23	11·9	34·0	20	12·1	21·0	15	−29·2	− 1·3
24	10·0	25·5	21	3·0	24·0	16	−11·4	− 1·3
25	9·1	28·0	22	24·2	41·0	17	− 6·2	15·3
26	10·0	30·0	23	6·0	23·8	18	5·2	26·1
27	22·8	26·2	24	−14·0	5·5	19	6·2	15·3
28	15·2	22·0	25	− 2·0	15·2	20	2·6	24·5
29	13·8	17·5	26	5·0	32·0	21	− 2·2	16·7
30	12·5	17·0	27	− 7·0	14·6	22	5·2	22·0
Dec. 1	14·9	18·9	28	− 6·9	14·9	23	−11·6	4·5
2	5·5	17·0	29	− 2·2	32·2	24	−14·5	22·0
3	− 4·9	8·0	30	8·0	18·5	25	− 8·9	13·3
4	− 5·5	17·2	31	− 7·0	19·8	26	−13·8	1·0
5	5·2	16·2	1858.			27	−12·3	5·0
6	1·5	23·0	Jan. 1	− 3·5	21·9	28	−14·7	5·0
7	−13·0	5·0	2	5·1	40·0	29		
8	2·0	8·5	3	29·0	45·0			

Continuation of the Observations on the Temperature of the Earth and of Forest-trees, made at Carlton, on the Saskatchewan.

Date.	2 feet.	3 feet.	Populus.	Abies.	Atmosphere.
1858.	°	°	°	°	°
Feb. 1	21·8	26·0	....	15·0	2·0
2	21·8	26·0	− 7·0	−12·0	− 9·9
3	21·0	25·8	− 2·5	....	0·0
4	21·0	25·6	....	+ 7·0	+25·8
5	21·0	25·3	....	20·5	26·0
6	21·0	25·0	15·5	18·5	11·3
7	22·0	25·8	....	− 3·5	−14·3
8	21·0	25·8	− 4·2	−15·0	−11·2
9	20·7	25·2	−13·0	....	−25·0
10	19·4	25·0	−20·0	....	−22·0
11	18·2	24·5	−24·0	....	−23·7
12	17·5	24·0	−25·0	....	−27·3
13	15·0	24·0	....	−20?·0	−29·3
14	14·2	23·1	The mercury shrunk into the bulb.		−36·0
15	13·5	21·5			−32·3
16	11·7	21·0			−15·3
17	11·5	20·4	− 9·5	−14·0	− 8·7
18	....	....	....	....	− 6·0
19	13·0	19·4	....	....	− 7·4

TABLE (*continued*).

Date.	2 feet.	3 feet.	Populus.	Abies.	Atmosphere.
1858.	°	°	°	°	°
Feb. 20	....	....	....	− 2·0	− 3·0
21	....	....	....	....	− 7·5
22	15·0	20·0	+ 4·0	− 5·0	− 2·0
23	....	....	....	+19·5	+37·0
24	17·1	20·6	....	+16·5	30·8
25	Thermometers frozen.				35·3
26					30·3
27					6·6
28			+ 7·5	0·0	....
Mar. 1	19·8	23·0	7·0	....	1·0
2	18·8	23·0	....	6·3	1·0
3	18·0	22·6	12·5	....	17·2
4	18·8	22·0	....	11·0	22·0
5	19·0	22·2	21·5	....	26·2
6	19·8	22·2	....	26·0	33·2
7	20·7	22·2	28·6	29·5	32·5
8	23·0	23·5	31·0	....	31·5
9	24·0	24·5	30·0	....	16·0
10	....	....	....	24·2	....
11	24·8	24·8	28·0	28·0	28·2
12	25·0	25·2	....	26·0	38·7
13	25·8	25·8	29·5	....	30·0
14	26·0	26·0	28·0	....	31·0
15	26·5	26·5	32·2	....	38·5
16	26·8	26·8	32·0	32·0	....
17	27·0	27·0	32·0	....	28·0
18	27·7	27·2	31·0	26·3	31·0
19	27·8	27·8	31·0	The thermometer of the *Abies* was withdrawn on account of the thawing of the river, which it was necessary to cross to the other side.	43·3
20	28·0	28·0	30·8		32·8
21	28·0	28·0	26·0		21·2
22	28·0	28·0	27·2		31·9
23	28·0	28·3	31·2		35·7
24	28·5	28·6	31·8		42·0
25	28·8	28·9	31·8		37·8
26	28·8	29·0	32·0		32·2
27	29·0	29·0	32·0		38·2
28	29·0	29·0	32·0		44·7
29	29·4	29·0	32·5		28·1
30	29·5	29·0	33·0		40·3
31	29·8	29·6	35·0		39·0
April 1	29·8	29·6	32·0		....
2	29·8	29·7	32·5		32·8
3	29·8	29·7	32·0		26·9
4	29·8	29·7	32·0		28·6
5	30·0	29·8	31·7		28·3
6	30·0	29·8	33·0		40·0
7	30·0	30·0	33·8		39·4
8	30·0	30·0	32·5		36·1
9	30·0	30·0	33·5		40·0
10	30·0	30·0	34·5		42·9
11	30·0	30·0	33·0		49·8
12	30·2	30·0	34·5		48·4
13	30·2	30·0	34·0		....
14	30·2	30·0	....		26·2
15	30·2	30·0	32·0		16·0
16	30·3	30·2	32·0		25·4
17	30·3	30·2	....		28·3

TABLE (*continued*).

Date.	2 feet.	3 feet.	Populus.	Abies.	Atmosphere.
1858.	°	°	°		°
April 18	30·5	30·5	32·0	....	43·0
19	30·6	30·5	35·0	....	42·0
20	30·7	30·6	36·0	....	44·0
21	30·7	30·6	....	....	43·0
22	30·8	30·7	34·5	....	36·0
23	30·8	30·7	37·5	....	32·0
24	30·8	30·7	....	....	42·0
25	30·9	30·8	34·5	....	45·0
26	31·0	30·8	....	....	44·0
27	31·0	30·8	....	....	54·0
28	31·0	30·8	47·8	....	41·0
29	31·2	30·9	54·0	....	53·9
30	31·2	30·9	....	....	....
May 1	31·3	30·9	59·0	....	68·5
2	31·6	30·8	....	....	48·0
3	32·0	31·0	59·0	....	61·0
4	32·2	31·0	In flower.	....	56·5
5	32·3	31·0	49·0	....	42·0
6	32·4	31·0	52·0	....	52·0
7	32·5	31·0	54·2	....	54·0
8	32·7	31·0	....	....	50·0
9	33·0	31·0	....	....	51·0
10	33·2	31·2	....	....	37·0
11	33·5	31·4	47·8	....	37·0
12	33·5	31·4	....	....	42·0
13	33·5	31·4	38·5	....	37·0
14	33·0	31·5	38·7	....	39·0
15	33·0	31·7	....	....	37·0
16	30·0	31·7	....	....	39·0
17	33·0	31·7	40·7	....	36·2
18	33·0	31·7	40·8	....	38·3
19	33·3	31·8	48·2	....	49·5
20	33·7	31·9	46·5	....	54·5
21	34·0	31·9	49·7	....	49·0
22	35·0	31·9	49·8	....	52·0
23	35·5	32·0	54·0	....	51·0
24	36·0	32·0	....	....	62·0
25	36·2	32·0	62·3	....	58·0
26	36·7	32·2	....	....	43·0
27	36·9	32·3	50·5	....	47·0
28	36·9	32·3	....	....	50·0
29	36·9	32·6	....	....	44·0
30	....	....	....	....	....
31	36·2	32·8	....	....	44·0
June 1	36·4	33·0	....	....	52·5
2	36·7	33·0	Leaves.	....	62·0
3	37·5	33·2	60·0	....	62·0
4	38·6	33·8	58·2	....	66·0
5	39·7	33·9	54·0	....	57·0
6	40·0	34·2	50·5	....	50·5
7	40·0	34·9	....	....	57·0

The earliest plants to flower were the following :—

1858. April 13.—*Alnus Americana, Anemone patens.*
May 3.—*Phlox Hoodii, Populus tremuloides.*
May 5.—Two *Salices, Populus balsamifera.*

May 6.—Two other *Salices*, *Shepherdia argentea* and *Hippophaë*, *Lathyrus* ?, *Equisetum*, *Tussilago*, *Negundo Fraxinus*, &c.

May 7.—*Viola* (two species), *Potentilla*, *Ranunculus*, *Androsace*, *Astragalus*.

May 8.—*Fragaria Canadensis*, two *Carices*, and *Poa*.

May 10.—*Salix*, *Lithospermum*, *Astragalus*.

Maximum and Minimum of every Twenty-four Hours (I began by the minimum) :—

Date.	Min.	Max.	Date.	Min.	Max.	Date.	Min.	Max.
1858.	°	°	1858.	°	°	1858.	°	°
Feb. 1	−21·5	24·0	Mar. 15	31·0	39·0	Apr. 27	35·2	75·0
2	−30·4	− 9·0	16	31·3	35·8	28	25·0	54·0
3	−25·2	0·0	17	25·8	31·5	29	27·2	64·5
4	9·7	32·0	18	15·5	33·0	30	31·0	65·0
5	14·0	32·2	19	12·0	41·2	May 1	42·2	69·0
6	− 9·1	12·7	20	14·4	33·6	2	45·0	75·5
7	−23·0	− 6·8	21	4·1	27·5	3	37·2	71·0
8	−24·7	3·0	22	23·7	40·0	4	40·1	73·2
9	−28·3	−10·0	23	31·0	40·0	5	30·0	52·7
10	−33·3	− 4·7	24	25·5	41·5	6	33·5	60·0
11	−27·0	− 7·8	25	21·6	39·8	7	38·8	61·7
12	−36·0	−19·7	26	22·5	35·4	8	31·0	63·3
13	−37·0	−24·0	27	21·0	41·2	9	33·0	60·8
14	−42·1	−23·6	28	15·8	49·5	10	33·0	59·8
15	−54·0	−24·2	29	32·4	45·0	11	14·5	43·8
16	−32·3	− 9·7	30	30·2	43·8	12	24·2	45·5
17	−13·2	− 1·6	31	29·0	45·9	13	20·0	32·0
18	−21·5	+ 1·2	Apr. 1	25·6	49·0	14	13·8	42·0
19	−24·4	3·8	2	25·3	34·6	15	27·0	58·7
20	−26·0	2·0	3	18·0	26·9	16	26·5	44·5
21	−31·0	8·0	4	16·0	37·0	17	28·6	48·0
22	−15·0	14·0	5	13·0	32·7	18	19·0	49·0
23	+ 3·6	39·2	6	22·0	47·0	19	30·5	61·3
24	7·2	32·8	7	22·0	48·8	20	41·2	70·3
25	18·4	44·6	8	22·0	37·2	21	34·0	72·2
26	19·0	39·0	9	18·6	48·7	22	39·0	67·2
27	− 5·0	18·8	11	26·7	53·7	23	40·0	68·4
28	−16·5	10·0	12	27·0	67·8	24	50?·3	70·0
Mar. 1	−18·0	2·4	13	24·5	50·0	25	35·3	69·0
2	−23·2	1·0	14	14·7	28·4	26	38·0	49·4
3	+ 3·3	17·2	15	9·0	48·0	27	45·0	54·7
4	8·0	20·7	16	9·0	48·0	28	38·9	54·0
5	3·0	24·0	17	19·8	42·0	29	33·7	48·8
6	15·5	39·1	18	34·2	61·0	30	31·9	51·0
7	12·6	35·8	19	29·0	63·0	31	27·6	56·2
8	23·7	38·8	20	23·6	52·5	June 2	44·0	72·0
9	22·9	46·7	21	18·0	48·3	3	49·5	70·0
10	13·7	30·5	22	20·0	44·2	4	46·8	77·8
11	15·6	37·7	23	20·2	45·5	5	44·0	63·3
12	21·2	39·2	24	26·5	55·0	6	31·9	56·0
13	11·7	43·8	25	28·0	52·7			
14	12·0	44·0	26	36·1	70·0			

Various Observations on Temperature made at Carlton in 1858.

		Feet.		Atmosphere.
			°	°
May 16	Water of the river at 9 A.M.	...	40·7	33·0
	Glacier in a bog surrounded with poplar-trees :			
	Under the ice towards the bushes of *Salix* ...	...	33·0	
	Open side between the ice and the earth ...	...	34·8	
	Under the ice at the foot of the *Salix*	...	34·7	
	Source of the bog	...	37·6	
	The bush of *Salix* had several catkins in flower.—The observations were made at noon.			
17	Another bog situated beside the *Populus* on which I made my observations:			
	Water of the bog at 10 A.M.	...	45·0	45·7
18	Water of the river	..	41·3	35·8
June 6	Poplar-bush, the leaves of which are twelve days later, at a depth of	3	41·0	
	Towards the roots, at 2 inches in the earth...	...	50·0	51·5

Measurement of some of the largest Trees observed in the Neighbourhood of Carlton.

Circumference in French mètres.

	Mètres.	Centimètres.
Populus balsamifera	2	53
Populus tremuloides............................	1	15
Abies alba	2	25

Observed by Lieut. Blakiston, at Mosquito Point, on the Lower Saskatchewan, lat. 53° 50′, long. 102° 53′:—Abies alba? 2 mètres, 58 centimètres. The largest remarked, after quitting Hudson's Bay, near the great rapid of the Saskatchewan, 1 m. 60 cent.

Observed by myself in the Valley of Arches in the Rocky Mountains:—Abies nigra? 3 m. 69 cent. nearly; height about 160 feet. Most of the forest-trees had nothing remarkable in their size, the too frequent burning of the forests forming an impediment to the development of their beauty.

A few Observations on the Temperature of the Earth in the Prairies of the Saskatchewan.

		Depth.		Atmosphere.
1858.			°	°
Aug. 23	At the base of the Rocky Mountains... ...	3	42·5	58·0
24	At 9 A.M.	id.	42·0	55·0
27	On the Prairies of the Saskatchewan... ...	...	42·5	59·0
30	” ” ”	...	44·0	60·0
Sept. 2	” ” ”	...	47·0	38·5
7	” ” ”	...	45·0	40·5
9	” ” ”	...	46·0	39·0
10	” ” ”	...	46·0	40·0
14	” ” ”	...	45·2	47·5

Temperature of the Earth and Atmosphere at Edmonton at 9 A.M.

1858.	2 feet.	Atmosphere.		2 feet.	Atmosphere.
Nov. 9	37·5	44·0	Dec. 8	28·5	+10·0
10	37·5	34·0	10	26·0	− 7·5
11	37·5	31·5	12	23·0	−16·0
14	36·8	32·0	13	21·5	−10·5
18	35·5	20·0	18	21·0	−10·5
21	35·0	19·0	20	18·5	− 9·0
24	34·5	17·0	24	17·0	−18·0
27	33·7	25·0	28	16·5	−15·2
30	33·0	0·0	30	15·7	+ 1·7
Dec. 2	32·0	−14·0	1859.		
4	31·8	− 1·0	Jan. 2	13·5	− 1·7
6	30·0	−23·5			

Letter from J. W. Sullivan, Esq., on the subject of the accompanying Observations. Addressed to J. D. Hooker, Esq., M.D., F.R.S., F.L.S.

Fort Edmonton, Saskatchewan,
January 10th, 1859.

Sir,—I have taken the liberty of forwarding the accompanying sheet of Thermometrical Observations on the soil, which I made on the route of the expedition during the last season.

As M. Bourgeau's time was wholly taken up in collecting and drying his botanical specimens, I undertook the observations when opportunity permitted, and carried them on according to the directions you gave him.

I would have willingly made a more extensive series, but the plan of our travels in the Rocky Mountains, when the party was broken up and dispersed in different directions, put a stop to the work. However, I will endeavour during the ensuing season to obtain as large a number as possible. They will no doubt be of some value, especially if we are to extend our explorations to the shores of the Pacific Ocean.

I have the honour to be, sir,
Your obedient servant,
J. W. Sullivan,
Secretary to the Expedition.

Observations on the Temperature of the Soil, taken during the above Journey, by J. W. Sullivan, Esq., Secretary to the Expedition.

Lat.	Long.	Date.	Ther. in Air.	Ther. in Soil.	Nature of Soil.	Remarks.
52° 32′ N.	109° 6′ W.	1858. July 3	° ..	° 44·9	2½ ft. V.M.—F.S.	Superior soil to any in the neighbourhood.
52 35	109 22	4	..	54·2	1½ ft. V.M.—F.S.	Near poplar clump.
52 35	109 40	6	50·	49·9	S.	On a sand-hill near to a growth of small poplars.
52 36	110 23	7	56·	53·9	S.	
52 36	110 50	8	65·	50·2	S.	Valley of Battle Riv.
52 33	111 20	9	58·7	49·1	½ ft. V.M.—S.	Near poplar patches.
52 28	111 30	10	66·6	54·2	.. ..	Valley of Battle Riv.
52 28	111 30	11	62·0	54·5	.. ..	do.
52 27	112 0	13	..	53·9	1 ft. V.M.—S.	Fine pasture here.
52 24	112 19	15	55·5	51·9	do.	Poplars and fine pasture.
52 24	112 19	16	65·0	52·2	do.	Same place.
52 24	112 19	17	70·0	52·2	do.	do.
52 23	112 40	18	..	52·1	do.	Fair growth of poplars.
52 23	112 40	19	65·	51·9	do.	
52 19	113 3	20	84·	53·4	S.	Dead Man's Creek.
52 19	113 3	21	57·	53·4	.. ..	do.
52 18	113 10	22	58·	52·0	3 ft. V.M.	Valley Red Deer R.
52 13	113 40	23	47·	52·5	do.	Nick Hills.
51 56	114 10	24	50·5	50·5	2 ft. V.M.—S.	Edge of the woods.
51 56	114 10	25	65·7	49·0	do.	do.
51 56	114 10	26	72·	50·0	do.	do.
51 56	114 10	27	69·5	50·1	do.	do.
51 56	114 10	28	65·	49·5	do.	do.
51 56	114 10	29	57·	49·5	do.	do.
51 36	114 0	30	63·	51·9	½ ft. V.M.—S.	In a creek valley.
51 26	114 0	31	46·	54·4	S.	do.
51 20	113 55	Aug. 1	75·2	54·9	S.	Prairie.
51 20	113 55	3	76·	55·1	S.	do.
51 9	115 6	9	60·	47·2	Shingle.	Bow River.

V.M. signifies Vegetable Mould
—F.S. „ followed by Fine Sand.
S. „ Sand.

Second Letter from M. E. Bourgeau, Botanist to Capt. Palliser's American Exploring Expedition. Addressed to Sir W. J. Hooker, F.R.S., F.L.S., and communicated by him.

[Read May 5th, 1859.]

Fort Edmonton, Saskatchewan,
October 9th, 1858.

Sir,—I have much pleasure in laying before you the results of my botanical labours during this second season.

I suppose that you have received my account of the preceding season, in which I gave you full details up to Fort Carlton. I shall now, therefore, confine my narrative to the period between that locality and the Rocky Mountains.

The expedition started on the 15th of June, crossing the prairie Saskatchewan between the two arms of the river of the same name. Some days afterwards I found several places rich in leguminous plants, and particularly some *Astragali*, which I had not found in the previous year. The numerous plants which I gathered led me to hope that I might find some fine things farther on. My only difficulty was from the rains, which fall annually in June and July. I recorded thirty-three days of more or less continuous rain. I have succeeded in preserving all my collections, without losing a single packet. I have not found as many different species as I had hoped to do. I have preserved many species already gathered the first season, on account of their forms, the dates, or their geographical distribution: probably half the collection is in duplicate.

On the 26th June we travelled over the open and treeless prairie, and on the 27th we encamped by a small forest of the two species of *Populus* (lat. 52° 39′ N., and long. 108° 52′ W.). On the 2nd July we reached more abundant forests, composed of the same trees, with thickets of rather large *Salix*, which provided us with excellent firewood.

The spaces between the forests consist of more or less marshy prairies, with large plants of different species, nearly all inhabitants of the forests, such as *Lathyrus*, *Vicia*, *Orobus* ?, *Astragalus*, and *Carex*, in abundance.

The prairies are rich in food for animals, the grass averaging in height from 18 inches to 2 feet (lat. 52° N., long. 109° 3′ W.).

From the 3rd to the 7th July we crossed a wooded sandy slope. In many places the vegetation appeared to have suffered from the frosts and the hail. All the poplars looked as if they had been trimmed. The ends of the branches are cut by the frost nearly every year, and the number of checks which they thus receive gives them a peculiar appearance. Near this place we crossed two wide spaces, where the hail had destroyed all the vegetation except the trees and the *Salix*.

It is worth describing to you the inconvenience of some seasons; for instance, the frosts which occurred this year, on the 15th of May and the last week of July, destroyed all the seeds of the trees; and the catkins of the *Populus* and *Salix* fell to the ground without ripening. The same thing occurred with the coniferous trees; and thus I have been unable this year to procure the seeds of any trees.

On the 10th of July we encamped on the shores of the river Battle, between the woods and rich prairies. The soil appears very fertile here; and I remarked some specimens of *Abies alba* and of *Pinus Banksiana* which had escaped the fire—the first observed since leaving Carlton. This river is insignificant in summer. Towards the boundary of the woods it is in some places sunk between high banks. Lat. 52° 28′ N., long. 111° 17′ W. from Greenwich.

From the 18th to the 20th of July we encamped on the prairies and amid thickets near the Lake de Bœuf, which contains an abundance of a rather large fish of excellent quality. At this place we were about fifty miles from the superb river De la Biche, which is of sufficient size for the navigation of the ordinary boats of the country. Its shores are wooded for about 100 miles, particularly with *Abies alba* and the two species of *Populus*, useful as timber. Vegetation also is vigorous, and the soil appears to be very fertile. The varieties of herbaceous plants are not very numerous, but the quality of the species forms a good forage for horses. Fires appear to have been less frequent in this latitude —52° 1′ N.

On the 24th, 25th, and 26th July, we were in sight of the magnificent chain of the Rocky Mountains. I here observed a change in the vegetation. The first plants which attracted my attention were the *Geum rivale*, *Polygonum viviparum*, two species of *Geranium*, &c. Although still 100 miles from the mountains, I am each day in hopes of finding new plants.

Near a large "coulée" named the "Coulée of Coloured Stones," the prairie is magnificent; the *Astragali* especially forming a great ornament to it. There are large patches of different colours, particularly red; a yellow and a white *Astragalus*; a red, a white, and a violet *Geranium*; a *Hedysarum*; the three varieties of *Rhinanthus*, &c.,—forming an *ensemble* most attractive to a botanist.

At last, on the 7th of August, we arrived at the foot of the Rocky Mountains, at the place where stood the ancient fort, in lat. 51° 9′ N., long. 115° 4′ W.,—the shores of the River des Arcs being 4100 feet above the level of the sea. In ascending this river, it is found to flow from a large valley in the interior of the mountains, which I have named the Valley des Arcs, as far as the second lake, there being a first and a second Lake des Arcs. The high peaks of this valley bear the following names: Pic des Pigeons, Pic de la Grotte, Pic du Vent—the last being so named from the storms which begin upon its summit. I have explored this valley more than any, and especially the mountains on the northern side of the Pic du Vent, which I have found peculiarly rich in alpine plants. From the river to the limit of the snow, all the chain of peaks, as far as the eye can reach, are wooded, principally with three species of conifers, *Abies nigra*? and *alba*, and *Pinus*. The latter grows mostly on the southern slopes, and does not much exceed thirty feet high—the largest being about one mètre in circumference. The *Abies nigra*? is the largest and tallest of the forest-trees which I have observed in the Valley des Arcs; one which I measured was 3 mètres 23 centimètres in circumference. There are also other forest-trees in greater or less abundance, as *Populus balsamiflua*, *P. tremuloides*, *Betula papyracea*, and *B. pumila*. The shrubs are mostly the same as in the plains, except some *Salices* of the alpine region.

There are considerable obstacles to travelling in the mountains. The forests suffer almost every year from fires; the trees fall in all directions on the ground, and thus form innumerable barricades to the progress of horses, and even of men. To ascend to the summit of a mountain, a very hard day's work is needed to cross the forest region. This description holds good of all the localities which I have visited.

I am happy to inform you that I have made a good collection during this season. I hope that I have gathered the greater number of the plants inhabiting that portion of the mountains which I have visited, and which I have been able to explore in seventeen days. For weighty reasons it was not possible for me to remain there longer.

The month of August is the best period of the year, the plants being in perfect flower, and some few in fruit. I observed but few withered kinds.

List of some species gathered close to the perpetual snow :—

Silene acaulis.
Silene —— ?
Arnica.
Menziesia ?
Pedicularis.
Gnaphalium.
Erigeron.
Artemisia.
Saussurea.
Luzula.
Saxifraga.
Draba.
Androsace.
Vaccinium.
Salix herbacea.
Poa alpina.
Aspidium.
Valeriana.
Aquilegia.
Dryas octopetala.
Epilobium.
&c. &c.

The nearest tree to the snow is *Abies alba,* which assumes the appearance of *Juniperus communis,* with which it grows; that is to say, it trails along the ground. The alpine region is from 6500 to 8600 feet in elevation.

The vegetation is not rich in species; the mountains are barren, with few streams and little humidity, and no pastures like those of the Alps. In the Rocky Mountains, streams are scarce on the southern slopes; on the northern, water is more abundant, owing to the snow; but they are only little torrents sunk deep in the rocks. This is the character of all the ravines which I have visited. The plants in the forests are for the most part common in the woods of the Saskatchewan plains. The number of species is about in the same proportion on the mountains as in the other parts of the country. They are few in number; but each species is abundant; and each mountain at the same elevation bears the same species, both on the north and on the south. All the collections made this season, and which are tolerably extensive and in a good state of preservation, are here at the Fort. Thanks to Captain Palliser, who has taken much interest in the success of my labours, and who has greatly assisted me in preserving the specimens from damp during the journey, I have about twenty-two packets of dried plants, and 110 of different sorts of seeds. The herbarium contains about 460 species, and about 60,000 specimens. I am now busy with the arrangement and packing of the collections, to be ready against the spring, the period fixed for my return to Europe.

I am, sir, &c. &c.,

E. Bourgeau.

Letter from Mr. CHARLES BARTER, Natural History Collector to the Niger Expedition, addressed to Sir W. J. HOOKER, F.R.S., F.L.S., and communicated by him.

[Read March 3rd, 1859.]

Steamer Rainbow, at Sea,
Fernando Po to Bonny,
January 2nd, 1859.

SIR,—In a brief note by last mail I noticed the sending of some cases containing the greater part of my dry collections; by this I send five cases more, and one small cask: this will comprise all that I have collected, or is fit to send home at present. The contents of these cases I will not refer to here; I have given Dr. Baikie a list of all, which he will send to you. The only living plants that I have considered it prudent to send at this season are about 40 species of Orchids, a Cycad, and some bulbous plants; these, in a close box, with dry shavings, will, I trust, be out of the reach of frost. The remaining living plants require to be sent in glazed cases. I have divided these as nearly as possible, and filled three cases, with directions for them to be sent home in April; these will reach home about the 6th of May—perhaps rather too early, but I cannot depend on any one looking after them here. Duplicates of each species (about 80 in all) I have planted out in a small piece of fenced-off ground at the Consulate at Fernando Po; if this is kept clear of weeds, the plants will not suffer much for a year, when I hope to return and replace with them any of those failing which I send now. Some ferns and moist-growing plants I have placed about dripping rocks in a ravine east of the Cove at Clarence.

Nearly all my dried specimens, I regret to say, have suffered much from damp since lying at Fernando Po: this is especially the case with dried fruits; and many fine specimens, brought from so far, I was obliged to throw away; a fine collection of cereals was in this way entirely destroyed. Much of this would have been saved, if, when we had come, everything had been removed up to the town on higher ground, instead of putting all into an old palm-oil shed on the beach; but our men were sick, and help from the shore could scarcely be obtained. All goes on well that can be done with one's own hand; but nothing can be got out of the liberated African.

Some of the plants in the cases are interesting. I notice especially the two kinds of Cola nuts, the produce of two distinct trees, one with four cotyledons, called "*Fatak*" by the Foulahs, the other with two cotyledons, called "*Gonja*" by the same people; the latter I have seen no living trees of; but it is said to come from the Ashantee country. The nut from which the present plant was raised I procured from a caravan at Rabba, on their return from the coast. The species with four cotyledons is the tree I mentioned formerly as existing at Fernando Po; I find it common in many parts of the lower Niger, abundant at Onitsha; it occurs also at Prince's Island, and is apparently a common tree along the coast. The flowers, like other *Sterculiaceæ* here, are variable in colour — cream-coloured, greenish-yellow, and pale-red. Both these species appear to be carried in about equal quantities into the interior; but the nut with two cotyledons is the most prized. "Gonja" in the Nupe country is worth about 100 cowries each nut, while "Fatak" averages about 80 only. The value of cowries at Rabba is 2500 for the dollar at 4*s*. 4*d*. Immense quantities of Cola nuts pass during the dry season from the coast to the interior. Caravans pass Rabba on the Kworra about half the year; of them about 1000 donkeys monthly are laden with Cola nuts: these are carried pannier-fashion—a basket on each side, each basket weighing on an average 50 lbs. Other caravan routes exist into this part of Africa; the principal one crosses the Kworra above Busa, direct for the Hausa country. Cola nuts are not much carried in the pod—this method is too cumbersome; but as it is necessary to keep them moist, and protected from the dry winds, the baskets are well protected with the leaves of a species of *Phrynium*, which keeps moist, and does not readily decay. Steamers running up this river might take some tons of Colas from the lower Niger, and dispose of them with advantage at Rabba.

The plant in case, called "*Bitter Cola*," is very different from ordinary Cola. I purchased dry nuts a long time since in the markets of the Borgu and Nupe countries, but could then ascertain nothing more than its coast origin. The seeds are much valued by the people for their medicinal properties, and command a higher price than Cola; the nuts are intensely bitter, but not astringent as common Cola. This tree I have not seen, but it grows at Onitsha and at Fernando Po; the fruit is about the size of a small peach, rose-coloured, and very pretty. The large *Artocarpean* noticed by Vogel in 1845 (the "Oqua" of the Eboe), I send many plants of, and have some 200 others planted out at Fernando Po. Its enormous fruit is very curious, but, I fear, as a fruit of little value beyond its edible seeds; it is however a fine ornamental tree for planting in any of our tropical colonies. *Bassia Parkii* has puzzled me much: first I could not induce them to vegetate for months; now they continue dying off; but I trust some will reach home alive. The young plants of the "Opakala" will prove valuable, both as an economical plant, and as a fine tree. I have enclosed some of its large ligneous pods and edible seeds in one of the boxes. It grows in the lower Niger, Fernando Po, and Prince's Island; the negroes collect the seeds, boil them slightly, slice and dry them for future use. Some plants of the *yellow dye* (of Soudan) in the case are very small; but it has large roots, and a tendency to be herbaceous, so perhaps will not be dead, if invisible, when the case is opened.

We visited Prince's Island to purchase stock, and recruit the health of our sick people by a sea breeze. This island, unlike Fernando Po, has no very elevated land; it presents from the sea a number of peaks, an immense block of rocks (some conical, others flat-topped), with butting cliffs or perpendicular walls of sheer precipices more than 1000 feet high, these bare of any vegetation, white and dazzling in the tropical sun. We steamed into West Bay amidst torrents of rain, which, clearing up, showed a number of pretty cataracts descending in streams down the precipitous sides of the little mountains, in thin silver lines—when shooting the rock, spreading out as they came down in a horsetail manner, till, falling far down, they were lost in a cloud of mist and vapour below. The rocks are mostly soft, having been changed by igneous action. The soil is rich, composed principally of decomposed trap; beds of conglomerate and pebbles lie about the base of the hills.

This island is celebrated for producing good coffee. Chocolate is also much grown, or rather has been extensively planted; numerous ravines, dark and gloomy, abounding in moisture, are well adapted for its cultivation. Traces of sugar plantations exist; but its culture seems now abandoned. Indeed everything evinces decay, and no system of management; coffee trees appear here and there, as if dropped from the clouds, struggling for life among trees and shrubs by which they are surrounded. Cacaos, more vigorous in growth, maintain their existence better, and soon take entirely for themselves the moist places in which they have been planted; the fruit of this was ripe at the time, and seemed the favourite food of monkeys, which must be very destructive to the crop. Ginger, arrowroot, yams, and all the fruits of the coast are grown here in abundance for the supply of ships. Many fruit-trees have become wild; this is especially the case with *Anona muricata*, *Persea gratissima*, and *Carica Papaya*. Plantain, banana, mango, lime, guava, form no inconsiderable portion of the "bush" in the lower grounds; the pine-apple too, established everywhere, will defy extirpation. A Portuguese lady, long resident here, has attempted cultivation on a large scale. Her houses are large, and built in a style of magnificence unlooked-for out here: about them are avenues and vistas lined with graceful cocoa-nut trees in the background; *Jatropha multifida*, *Poinciana pulcherrima*, and a species of *Fourcroya*, planted at regular intervals, form the margin, and have a very pretty effect. I was unsuccessful in reaching the higher grounds, in two attempts, owing to the excessive rains and the density of the forest. Under the tall trees during the rains it is so dark and gloomy, that plants can hardly be seen; I therefore gathered but few. Much of my collecting was done in a boat, landing here and there whenever a footing could be obtained. Dr. Baikie and I visited many of the small islets which lie just detached in these bays, generally with a thorough drenching. These are mere rocks rising 20 or 30 feet above the water; some of them were covered almost exclusively with *Oleandra nodosa*, fully exposed to the sun and sea-breeze. The plants were 3 or 4 feet high, quite shrub-like in character, beautifully in fructification, and covered with lichens. On the steep sides of the larger rocks grew an abundance of a very large Orchid, resembling a *Vanda* in habit, but, like too many of the African Orchidaceæ, with small, yellow, insignificant flowers. *Melastomaceæ*, as usual, were plentiful; one species, 12 or 16 feet high, with magnificent red flowers, would be a fine ornamental plant in our stoves at home. I have sent, in the cases, plants of another species, of small growth, rose-coloured flowers, and scorpioid inflorescence. Species of *Mussænda*, with their conspicuous white bracts, were common; also a shrub with spikes of purple flowers, like a *Veronica*: this had a singular pair of white leaves at the base of each spike, rendering it a very showy plant. Ferns were not wanting,—*Drymaria*, *Asplenium*, *Elaphoglossum*. *Polytrichum commune* I was much surprised to find occupying the moist hollows on the top of the rocks in dense tufts; with it, almost buried in the moss, grew *Trichomanes crispum*. In shady places a very pretty fern was growing, an *Asplenium* somewhat resembling *Darea cicutaria*, but of a still more elegant habit.

Whoever has an opportunity of visiting the quiet nooks in the bays about these islands will be struck with the exquisite beauty of the waters and the various forms which can be seen beneath them. At 50 or 60 feet, the eye penetrates with ease: the bottom is rocky and very irregular; the boat at one moment glides over masses of coral-bound rock many feet below, but on which many beautiful sponges and corallines can be seen; the rest reveals nothing but a cavernous depth of blue water, unless a shoal of those beautiful fish of the tropics dart across. The rocks and everything that is exposed to the alternate action of the tides are covered with the small Mangrove Oyster; below it, seldom exposed, grows a pretty crimson Coral, with it a large *Flustra.* Gorgeous *Actiniæ*, with the common *Echinus* and Starfish of more northern climes, abound in all the little salt pools, on these rocks. The sponges are very large; but few are sufficiently soft to be fit for use. The waters are almost destitute of Algæ; I gathered but one species of *Fucaceæ*, and that not attached; a small plant of confervoid growth alone represents the family.

The vegetation of Prince's Island, from its proximity to Fernando Po, cannot, of course, be essentially different. At present I have seen so little of either island, that scarcely anything like a comparison can be ventured on. At Prince's Island I was at once struck with the abundance of *Begonias*; at Fernando Po only one species (and that with yellow flowers, and therefore a questionable *Begonia*) was seen. Some 10 or 12 species occur in Prince's Island: I gathered several; but being very juicy plants, I lost all but three in drying. I fancy three of those gathered to be identical with *B. nitida*, *B. ulmifolia*, and *B. Fischeri*. Most of the others were large-leaved succulent species, all having rose-coloured flowers; they grow on trees for the most part, a semiepiphytical life sustained in the black soil which collects on old trees of the forest. We found here an *Elæis*, which I fancy is distinct from *E. Guineensis*; the great size of some nuts which were brought alongside the ship for sale first drew my attention to it. These nuts were three times the size of *E. Guineensis*; the trees also present a different aspect, resembling more the cocoa-nut. The pinnæ in *E. Guineensis* stand out irregularly, some pendulous, others erect; in this variety they are somewhat pendulous, but all regular and on one plane, as in the Cocoa-nut: the tree is not abundant, but grows scattered along the shore. The Baobab, not seen at Fernando Po, grows pretty common at Prince's Island, also the "Opakala" (a large Artocarpean), or "Oqua" of the Eboe; the latter I secured in flower for the first time. Little marshy ground occurs; yet about the estuaries of small streams, *Avicennia rhizophora* and *Pandanus candelabrum* occur. The woods evince almost perpetual moisture; climbing *Aroideæ*, with immense orchids and ferns, occur; scarcely any of the orchids are interesting. Their flowers are insignificant, comprising such genera as *Angræcum*, *Bolbophyllum*, *Polystachya*. Of ferns, the most common are *Platycerium Stemaria* (very large), *Drymaria coronans*, *D. vulgaris*, *D. viridis*, *Asplenium crenulatum*, *A.* like *lucidum*, *Mertensia gigantea*, *Lygodium scandens*, *Gymnogramma Calomelanos*, *Angiopteris evecta*, *Acrostichum aureum*, *Lastrea mollis*, *L. invisa*, *Tæniopteris*. *Lastrea*, *Asplenium*, *Adiantum Diplazium*, *Gymnopteris*, *Trichomanes*, are largely represented. An *Acrostichum* resembling *Stenochlæna scandens* is very abundant, adhering to the trunks of trees like ivy. *Lycopodiums* are abundant, *L. dendroideum* especially, in loamy soil. *L. Phlegmaria*, epiphytical on trees, hanging down often a yard in length, and very beautiful.

I obtained a sprinkling of mosses, chiefly of *Hypnum*, some Hepaticæ, and a few curious Fungi.

This is a meagre account of the botany of this island; and my collection indicates little; the heavy rain, however, prevented me doing better. Much of the low land has been cultivated; and many introduced plants are now wild. *Canna indica*, *Caladium bicolor*, very beautiful in moist places, and a few European weeds exist—*Poa annua*, and *Plantago major*. An umbelliferous plant is very abundant, and must be indigenous; I believe it to be an *Eryngium*. Some very good cabbages are grown both at Prince's Island and Fernando Po without going to elevated ground; water-cresses are abundant in some of the brooks, but of course have been introduced.

Our repairs complete, we left Fernando Po on the 2nd of January. The weather in this island for the last three weeks has been almost free from rain, the days hot, with the usual haze of the dry season, called "smokes" by the traders. December to March are the best months for botanizing in this island. *Clerodendron splendens* and some fine scarlet *Combretaceæ* are very handsome at this season; most of the large forest-trees are also just flowering.

The mountains are seldom visible. Sometimes at dawn the peak of Clarence appears, but is enveloped in clouds soon after the sun rises; and an occasional glimpse of the stupendous Cameroon, towering far up in the firmament, is also obtained. I never rise at such times without anticipating the pleasure I shall have in ascending these untrodden alpine forests and the bare regions beyond, where the monotonous vegetation of the hot plains of the interior must give way, to be replaced by those forms only found at elevations, and an African mountain botany which cannot fail to yield much that is new to Botanical Science.

We reached the Bonny this evening (4th) and lie at anchor inside the bar. This river has a much better mouth than the others, and is safer; but some wrecks are visible from where we lie. We shall ascend by the Brass river on the 8th, under much better auspices than formerly. Some difficulty is apprehended through the shallow water; for I think the Niger has never been entered before at this season. If we get aground in the delta, it may be a temptation to the natives; but as long as we can keep a healthy crew, we have not much to fear from the people.

Writing is difficult at sea in so small a ship, but off the bars of these rivers impossible. I hope to date my next, in one month, from Rabba.

I remain, Sir, your obedient Servant,

Charles Barter.

P.S.—Consul Hutchinson and Lady arrived safely at Fernando Po; some roses which they received at Kew, I found alive, have had them planted, and all are growing.

Dr. Baikie, myself, and every European on board are in excellent health.

Second Letter from Mr. Charles Barter to Sir W. J. Hooker, F.R.S., F.L.S., &c., communicated by him.

[Read June 2nd, 1859.]

Steamer Rainbow,
Lagos, March 7th, 1859.

Sir,—By this mail I forward a bundle of dried plants, containing about 110 species, some specimens of woods*, the fruiting panicle of a *Calamus*, fruits preserved moist, and a few seeds. Some of the dried plants were collected on Lagos Island, but the greater part at "Eppah†," a town on the Crado Lake, about thirty miles east of Lagos.

We have spent more time here than could have been wished, through the district about Lagos being disturbed by the ex-king Kosoko, and news that the Dahomeans were about to attack Abeocuta. This induced Dr. Baikie to visit Kosoko at his town of Eppah, distant about thirty miles from Lagos, on the Crado Lake. H.M.S. Brune, with Consul Campbell on board, went with us. This chief (Kosoko) received us with much courtesy, and expressed himself desirous of remaining on good terms with the English. His previous acts do not warrant the truth of these professions; but for the present no impediment exists to our moving inland. Dr. Baikie and myself will therefore leave about the 12th; Lieut. Glover and Dalton will come up afterwards.

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* The collections arrived safely, April 1859. Though a comparatively small collection, they are extremely interesting.—W. J. H.

† Dr. Baikie says, this should be spelt "Ekpe."

The margin of the Crado Lake is nearly everywhere swampy, with but few tall trees, and scarcely any oil-palms; it may be said to be bounded with *Raphia vinifera*, which luxuriates in the fetid black mud, now (in the dry season) covered with fallen leaves, through which the foot sinks, at every step, above the ancle. Behind this the land rises; and about Eppah some rocks occur of soft iron conglomerate, with a rich loamy soil.

Lofty forest trees are first met with here, amongst which some tall *Clusiaceæ* are conspicuous; one with crimson flowers I recognize as being abundant in the lower Niger. It is a slender tree, 70 or 80 feet high, with branches only at the top, spreading out regular and drooping, so that in flower it resembles a gigantic crimson umbrella. All parts of this tree yield an abundance of yellow juice, resembling Gamboge when coagulated; some has been collected and sent to R. Bentley, Esq., to ascertain if it has any commercial value. Another large tree of this order I send dried fruits of, and some nuts; the latter are very oily, and a kind of butter is prepared from them: I suspect this to be *Pentadesma butyracea*, but do not know the plant.

A Rubiaceous tree (common on the Niger) grows about this lake. I cut down a tree, and obtained flowers, which grow in heads like *Sarcocephalus*; perhaps it is some *Nauclea*; the leaves are of great size in the young plant, with large foliaceous stipules. "Agidde," or country bread, is generally wrapped in the flexible leaves of this plant when it is exposed for sale in the markets. A noble *Composita* was seen here in open places; it sends up a slender stem from 10 to 20 feet high, unbranched, with large pubescent leaves on the top; its flowers, which are not ornamental, are produced when the plant has reached its height, after which it dies.

I send a large fruiting panicle of a species of *Calamus* (perhaps *C. secundiflorus*, for it is one of the commonest on the coast), and imperfect specimens of a new species which has almost entire leaves, and a stem without spines. Many species of these climbing palms exist in the hot jungles which abound on the coast, but they nearly all grow to a great height, firmly attached by their hooked spines to lofty trees. Flowers or fruit in such situations it is almost impossible to obtain, unless many trees are felled for the purpose.

About the town of Eppah I gathered some fine crimson-fruited *Sterculiaceæ*. An *Apocynea* with white fragrant flowers, *Acanthaceæ*, *Rubiaceæ*, and a few shrubby *Euphorbiaceæ* occupy the cleared places. *Phrynium Danielli* is very common in the deep woods; its singular-tasted fruit is now in the greatest profusion.

Orchids were very scarce; but on some old trees grew large masses of the *Rhipsalis*, which I sent from Prince's Island.

The large Rubiaceous fruit (enclosed) is employed by the people in marking their faces and other parts of the person with permanent black lines. I believe an incision of the skin is necessary to effect this properly. It is used chiefly by those people who pride themselves on a skin a few shades lighter than the ordinary negro of the coast; the latter is too black for such an embellishment to be visible.

No. 3298 of 'Herbarium,' is a beautiful Anonaceous shrub growing at Eppah: the flowers (now turned black in drying) are very handsome; the long outer petals are spotted red, brown, and yellow, quite white at the base; the inner ones, almost hooded, have a singular appendage midway on the margin, which I first mistook for stamens, till a closer examination showed it to be Anonaceous. No fruit or seeds could be obtained; but, as I shall probably meet with it again in the Yoruba forests, I hope to see it yet in our stoves at home.

Aquatic plants can hardly be said to be numerous in Western Africa; the following species occur in the Crado Lake:—*Papyrus antiquorum*, 10 or 12 feet high, is very abundant about Palaver Island when the water is brackish, with *Typha angustifolia*, *Vallisneria spiralis*, *Pistia stratiotes*, *Jussiæa villosa*, *Azolla Nilotica*, *Nymphæa dentata*, *Ceratophyllum vulgare*, *Utricularia stellata*, *Ceratopteris thalictroides*, *Salvinia* sp., *Lemna* sp., and a species of *Hydrophyllaceæ* with small blue flowers; these plants occur in small bays or creeks where the water is undisturbed by the swell raised by the sea breezes. The bed of this lake is hard white clay; average depth of water 10 or 12 feet.

Before our interview with "Kosoko," I could only get on shore quietly in a few places, penetrating twice about 3 miles inland. On this, the N.E. side of the lake, beyond the belt of swamp bordering it, the soil is fine rich loam, well-watered, and capable of growing any tropical produce. Some cleared ground occurs here and there; but very little of it is now under cultivation; for the growth of cotton it is well adapted. If the attention of the present occupiers could be turned to this article, several hundred square miles contiguous to water might produce cotton, which could be carried to Lagos by canoes merely across the lake. A considerable quantity of cotton is now coming down from Abeokuta (distant 70 miles from Lagos by river); the price paid there for cotton in the seed is one halfpenny per lb., three of which yield one pound pure when cleaned. Labour of cleaning, transit to Lagos, with shipment, raise it to 3*d.* per lb.; one penny more, freight to Liverpool, leaves still a profit; but a much larger supply is necessary before the leading merchants here will enter into the trade with the same advantage that now attends their dealings in palm oil.

Too much must not be expected of Central Africa as a cotton-producing country; the plant needs more moisture than it would obtain in much of the land in the interior, and water-carriage should never be far distant in a country where all loads are conveyed by canoe or on the heads of men and women. There is plenty of available land near the sea and by rivers; the great valley of the Niger would alone yield an enormous supply: it is here cotton must be looked for, and its growth encouraged; the great plains of the interior are almost as useless in this respect as Sahara itself.

I remain, Sir, your most obedient Servant,

CHARLES BARTER.

Note on the species of *Croton* described by Linnæus under the names of *Clutia Eluteria* and *Clutia Cascarilla*. By JOHN J. BENNETT, Esq., F.R.S., Sec. L.S.

[Read April 21st, 1859.]

DURING a late residence in the Bahama Islands, the attention of our indefatigable member, Dr. W. F. Daniell, was especially directed to the species of *Croton* growing in those islands; and I am enabled, by his kind communication of the specimens collected by him, to clear up much of the obscurity in which the species furnishing the Cascarilla-barks of commerce have been involved. I willingly leave in his own able hands that portion of the subject which relates to the Materia Medica and the commercial history of the Barks in question, and shall limit myself, in the present brief notice, to the botanical history and discrimination of the species which have been confounded together under the specific names of *Eluteria* and *Cascarilla.*

The first account given by Linnæus of *C. Eluteria* occurs in 'Hortus Cliffortianus' (1737), pp. 486–7. Of the plant there carefully described, an authentic specimen exists in Cliffort's Herbarium in the British Museum, with a portion of the description attached in Linnæus's own hand, and marked with the only synonym quoted:—"*Cortex Ilatheria.* Elutheria Provid. folio cordato subtus argenteo. Sweet bark, s. cortex bene olens. Petiv. Collect. p. 4 n. 276." The synonym; the habitat, "crescit in Insula Providentia;" and the name *Elutheria*, derived from the adjacent island of Eleuthera, all bespeak its Bahamian origin. Of this very distinct species, a specimen brought from the Bahamas forms part of Catesby's collections in the British Museum; and there also exist, in the Banksian Herbarium, a similar specimen of Catesby's from Gronovius, together with specimens from the Herbarium of Philip Miller, from the "Bahama Islands, Long Island," collected by Peter Dean, Esq., in 1788; and from the "southern parts of North America," collected by André Michaux, the latter sent under the erroneous name of *Croton Cascarilla.* Linnæus himself never possessed a specimen; and having, apparently, entirely forgotten its characters, he referred to it in his 'Flora Zeylanica' (1748), No. 366 (with several other equally erroneous synonyms), the *Mahapatigaha* of Hermann's 'Museum Zeylanicum,' of which no specimen existed in Hermann's collections, and added the officinal synonym of *Cascarilla.* Of the additional synonyms, that quoted from Breynius, Plukenet, and Seba, unquestionably belongs to the plant subsequently named by Jacquin *Croton niveum*; and that of Plumier and Catesby, as we shall hereafter see, is the foundation of Linnæus's own *Clutia Cascarilla.* In his 'Materia Medica,' published in the following year, he ascribes the Cascarilla Bark to the *Eluteria* of his 'Flora Zeylanica,' with the single synonym of Catesby; while in the first edition of 'Species Plantarum,' published in 1753, he quotes, under *Clutia Eluteria*, his 'Flora Zeylanica' and 'Materia Medica,' *Eluteria* of 'Hortus Cliffortianus,' and the mistaken synonym of Plukenet and Seba. Of all these, it is evident that the only true synonym is that of 'Hortus Cliffortianus,' from which the name of the species was derived.

Up to this time Linnæus had in his own herbarium no specimen referred to *Clutia Eluteria*; and there is no indication by which it can be positively determined whence and at what period the specimen which he subsequently designated by that name was obtained. It appears probable, however, that it was one of the Jamaica specimens received by him from Patrick Browne, and described in his 'Pugillus Plantarum Jamaicensium' (1759), inserted in the fifth volume of his 'Amœnitates Academicæ.' The description which he there gives (p. 411) of *Clutia Eluteria* is quite inapplicable to the original plant, and exactly agrees with this specimen. In the second edition of 'Species Plantarum,' he refers to this description, adds Patrick Browne's synonym, and retains that of 'Hortus Cliffortianus,' as well as the erroneous reference to Plukenet and Seba. It is only necessary to add, that in Swartz's 'Flora Indiæ Occidentalis' (p. 1183), Patrick Browne's plant is properly referred to the genus *Croton*, and is carefully described, under the name of *Croton Eluteria*, as synonymous with *Clutia Eluteria*, L., and that a figure of the true or Bahamian species, taken from one of Mr. Dean's specimens in the Banksian Herbarium, is given in Woodville's 'Medical Botany,' t. 223, together with a sketch of a miserable scrap of the Jamaica plant from a specimen communicated to the same Herbarium by Dr. Wright, who, in the eighth volume of the 'Medical Journal,' describes it as producing "the Cascarilla or Elutheria of the shops."

I now turn to the second species, *Clutia Cascarilla*, L. Linnæus had originally no knowledge of this species, except that which he derived from the figure of Catesby and the synonym of "*Ricinoides* elæagni folio," quoted by Catesby from Plumier; and both of these he referred, in his 'Flora Zeylanica,' to the confused heap there collected under the head of *Eluteria foliis cordato-lanceolatis*. The same confusion between the Bahamian and the Ceylonese species was continued in his 'Materia Medica'; but in the first edition of 'Species Plantarum' he distinguished the plant figured by Catesby under the name of *Clutia Cascarilla*,—mistaking, however, the habitat, which Catesby indicates as the Bahamas, and substituting Carolina in its stead. As he denotes by his usual symbol (†) that he had never seen this species, and quotes no other synonym than that of Catesby, there can be no question that the species is wholly founded on the figure and description of that author, both of which are remarkably good representations of a plant of which Dr. Daniell has brought home excellent specimens, and which (as far as I am aware) has never before been forwarded to European herbaria. Catesby's description is as follows:—"The Ilathera Bark; *La Chachrille.* These shrubs grow plentifully on most of the Bahama Islands, seldom above ten feet high, and rarely so big as a man's leg, though it is probable that, before these islands were exhausted of so much of it, that it grew to a larger size: the leaves are long, narrow, and sharp-pointed, and of a very pale light-green colour; at the ends of the smaller branches grow spikes of small hexapetalous white flowers, with yellow apices, which are succeeded by tricapsular pale-green berries, of the size of peas, each berry containing three small black seeds, one in every capsule. The bark of this tree being burnt, yields a fine perfume; and, infused in either wine or water, gives a fine aromatic bitter."

As in the former case, it was not until after the publication of the species in the first edition of his 'Species Plantarum,' that Linnæus became possessed of a specimen totally different from the original plant, but which he nevertheless referred to it. The same concurrence of circumstances as in the former case leads me to believe that this also was received from Dr. Patrick Browne. It perfectly agrees with the description of *Clutia Cascarilla* given in the same Dissertation in the 'Amœnitates Academicæ,' vol. v. p. 411, with the synonym of Browne, and with the figure of Sloane's 'History of Jamaica,' there quoted, and is the "Wild Rosemary" of most of the West Indian Islands, subsequently described by Jacquin under the name of *Croton lineare*—a name, which has since been generally, but erroneously, considered as synonymous with the *Clutia Cascarilla* of Linnæus.

It only remains to formularize these details, with the addition of discriminative characters, premising that both the original species and those which have been substituted for them are true Crotons, in the comprehensive sense in which that genus is still maintained.

1. CROTON ELUTERIA, foliis petiolatis subcordato-lanceolatis obtuse acuminatis supra viridibus squamulis peltatis raris punctatis subtus dense argenteo-lepidotis lucidis, spicis simplicibus axillaribus terminalibusque monoicis.

Elutheria Providentiæ, folio cordato subtus argenteo. Sweet Bark, s. cortex bene olens. *Petiv. coll.* 4, n. 276.

Elutheria, *L. Hort. Cliff.* p. 486!

Clutia Eluteria, *L. Sp. Plant.* ed. 1. p. 1042 (*excl. synon. omn. præter Hort. Cliff.*).

Clutia Eluteria s. Cascarilla, *Woodv. Med. Bot.* p. 633, t. 223. f. 2!

Hab. In Insulis Bahamensibus, *Catesby*! *Dean*! *Dr. W. F. Daniell*!

2. Croton cascarilla, foliis petiolatis anguste lanceolatis utrinque attenuatis acutis margine planis v. subundulatis supra viridibus glabris subtus pallidis pilis stellatis intricatis dense vestitis, spicis simplicibus terminalibus monoicis.

Ricinoides elæagni folio, *Plum. Spec.* 20; *Icon.* p. 236, t. 240. f. 1; *Catesby Carol.* vol. ii. t. 46.

Clutia Cascarilla, *L. Sp. Pl.* ed. 1. p. 1042.

Hab. In Insulis Bahamensibus, *Catesby*; "Providence," *Dr. W. F. Daniell*!

3. Croton lineare, foliis subsessilibus linearibus obtusis margine plus minus reflexis supra viridibus glabris subtus pallidis pilis stellatis intricatis densissime vestitis, spicis simplicibus axillaribus terminalibusque dioicis.

Ricino affinis odorifera fruticosa major, rosmarini folio, fructù tricocco albido, *Sloane, Hist. Jam.* i. p. 133, t. 86. f, 1!

Croton fruticulosum; foliis longis, angustis, subtus incanis margine reflexis, *Browne, Jam.* p. 347.

Clutia Cascarilla, *L. Amœn. Acad.* v. p. 411; *L. Herb.*!

Croton lineare, *Jacq. Amer.* p. 256, t. 162. f. 4; *Pict.* p. 124, t. 263. f. 80.

Croton Cascarilla, *Woodv. Med. Bot.* p. 629, t. 222.

Hab. In Ins. Jamaica, *Sloane*! *Houstoun*! *Wright*!; in Insulis Bahamensibus, *Catesby*! *Dr. W. F. Daniell*!

4. Croton Sloanei, foliis petiolatis ovatis obtusis v. obtuse acuminatis perforatis squamulis peltatis supra raris infra numerosis adspersis, spicis compositis axillaribus terminalibusque monoicis.

Mali folio arbor artemisiæ odore et flore, *Sloane, Jam.* ii. p. 30, t. 174. f. 2!

Clutia Eluteria, *L. Amœn. Acad.* v. p. 411; *L. Herb.*!

Croton Eluteria, *Swartz, Fl. Ind. Occid.* p. 1183; *Wright*, in *Med. Journ.* viii. p. 3! *Woodv. Med. Bot.* p. 634, t. 223. f. 1 (*pess.*)! *Hayne, Arzneygew.* xiv. t.

Hab. In Ins. Jamaica, *Sloane*! *Wright*!

These four species are so totally distinct, that, when once discriminated, they can never again be confounded. In addition to the three former, Dr. Daniell's collection from the Bahamas contains specimens of *Croton lucidum*, L., and *Croton balsamiferum*, Jacq.

Notes on *Homalium*. By GEORGE BENTHAM, ESQ., V.P.L.S.

[Read June 2nd, 1859.]

IN the revision of the 'Hong Kong Flora,' with which I have been lately occupied, I had occasion to investigate the validity of the genus *Blackwellia*, of which an elegant Chinese species was many years since introduced into our gardens, and has found its way into catalogues and botanical works under six different names. The result of this investigation has been the conviction that the genus must altogether be united with *Homalium*. I could not, however, come to this conclusion without a careful examination of all the species referred to both genera of which we had specimens; and as I also found several unpublished ones in the herbaria at Kew, I have been led to draw up a short synopsis of the whole group, which I now beg to lay before the Society.

The genus *Blackwellia* was originally established by Jussieu and Lamarck on two or three Mauritius trees which differed from the only two *Homalia* then known, both from South America, in having only one instead of three stamens opposite each petal (or inner segment of the perianth as it was then called). Ventenat afterwards added two or three eastern species having the same peculiarity; and De Candolle, in the 2nd vol. of the 'Prodromus,' maintained the two genera, with the same technical character as well as geographical distinction. Since then, several Asiatic species with two or more stamens to each petal have been described, and yet they have been published as *Blackwellias*. An exception, has been made in the case of the African *Homalium angustifolium*, which has the character of the American ones; and Sir James Smith, who always closely adhered to generic character, published it accordingly as a *Homalium*. Modern botanists, however, applying too literally the rule of "character non facit genus," appear in this instance to have practically adopted geographical origin as the sole basis of the limitation of the two genera. Some other characters are indeed indicated by Endlicher and others, such as the supposed larger calycine segments or capitate stigmas of the American ones; but none of them will bear the test of examination. And few, I believe, would now contest the generally admitted rule in systematic botany, that geographical origin without any character is not to be recognized as a generic distinction. It therefore becomes necessary to unite the Asiatic clustered-stamened species with the corresponding American *Homaliums*. As some of these, again, in other respects resemble the single-stamened species more than they do each other, and as the whole series have a remarkable conformity in the general structure of their flower as well as in foliage and in habit, it appears more appropriate to consider them all as one genus, which can be artificially divided into two sections on the old character.

There is one point, however, in which the American species appear slightly to differ from the Asiatic and African ones: the fruit, at least in *H. densiflorum* and *H. pedicellatum*, becomes very hard, and in our specimens shows no disposition to open in valves, whilst it does so most readily in some of the Asiatic ones, splitting the styles so as to cause them to have been occasionally described as double their real number. But I have not seen the fruit quite ripe in any species: the ovary, shortly after flowering, appears to harden in the Asiatic *H. grandiflorum* as in the above-mentioned American ones; and in the original American *H. racemosum* and *H. Racoubea*, the fruit is said to open in short valves at the top, although I see no tendency to it in our specimens. This character cannot therefore be made available for generic distinction, being accompanied by no corresponding differences in habit or in other organs.

Among old genera not really differing from *Homalium*, *Racoubea* (Aubl.) has long been united with it, and *Astranthus* (Lour.) with *Blackwellia*; Miquel has also correctly joined with it the *Condylocarpus* lately established by Blume. On the other hand, *Napimoga* (Aubl.), which does not appear to have been examined since his time, can scarcely be a congener, not having the characteristic glands: the analyses given, rude as they are, are not to be depended on for correctness, and afford no evidence of the plant belonging even to the same natural order.

In the distinction of the species, besides the artificial sectional character above mentioned, the inflorescence, either a close panicle with short divaricate branches, or long racemes, either solitary or few, forming a long loose panicle, as indicated by De Candolle, divides well the *Blackwellias* into two groups; and the species are mostly well characterized by the relative size and shape of the calycine segments and petals taken especially when slightly enlarged after the flowering is over. In some of the section *Blackwellia* they are all nearly of a size, linear or oblong, slightly narrowed at the base, ciliate at the edges, so as to give the young fruit precisely the shape of elegant little shuttlecocks; in *H. senarium*, *H. pedicellatum*, and others, they are all broader at the base, spreading or reflexed and radiate round the base of the hardened conical free part of the fruit; in others, again, all have a tendency to close over the young fruit. In *H. grandiflorum* and *parvifolium* the calycine segments are much enlarged, oblong, narrowed at the base, thin and spreading horizontally, whilst the shorter and broader tomentose petals close over the fruit: in the *H. bracteatum* the same arrangement apparently takes place; but it is the petals or inner row that are enlarged and spreading, whilst the calycine segments, or outer row, remain broad and short, and close over the fruit.

HOMALIUM, *Jacq.*

Homalium et Blackwellia, *Juss. Gen.* p. 343; *DC. Prod.* vol. ii. p. 54; *et Auct. recent.*—Cordylanthes, *Blume, Mus. Bot.* vol. ii. p. 27.

Calycis tubus turbinatus v. oblongus ovarii basi adnatus; limbus pluripartitus segmentis (4–12) petalisque totidem cum iis alternantibus persistentibus post anthesin sæpius accretis. Glandula pulvinata intus ad basin cujusve calycis segmenti. Stamina ad basin petalorum inserta iis opposita, tot quot petala, vel ad quodque petalum 2–7 approximata v. fasciculata. Ovarium uniloculare, basi adnatum et vacuum, superne liberum conicum, stylis 3–5 liberis v. basi connatis coronatum; placentæ parietales versus apicem cavitatis tot quot styli et cum iis alternantes; ovula in quaque placenta 2–6 (sæpius 4) pendula. Fructus paullo accretus, siccus, medio calycis segmentis petalisque persistentibus et sæpius accretis cinctus, apice valvulis stylos findentibus et medio placentiferis breviter dehiscens (v. induratus et indehiscens?). Semina pauca parva pendula oblonga. Albumen haud copiosum. Embryo rectus, radicula brevi supera, cotyledonibus oblongis tenuiter foliaceis.—Arbores fruticesve *regionum calidiorum utriusque orbis.* Stipulæ *parvæ, sæpius caducissimæ.* Folia *alterna integerrima v. sæpius obtuse dentata pennivenia.* Racemi *axillares simplices v. in paniculas terminales dispositi, v. paniculæ divaricate ramosæ.* Flores *ad axillam bracteæ parvæ sæpe inconspicuæ sessiles v. breviter pedicellati, solitarii v. fasciculati, singulive sæpius sub calyce minute bibracteolati.* Perianthium *sæpissime tomentosum v. pubescenti-ciliatum.* Ovarium *extus tomentosum v. villosum, intus plus minus villosum.*

Sectio I. BLACKWELLIA. Stamina tot quot petala singulatim iis opposita. Species omnes Gerontogeæ.

* *Paniculata.* Paniculis breviter divaricato-ramosis.

1. H. **Nepalense.** Foliis (amplis) petiolatis ovatis crenato-dentatis submembranaceis glabris, paniculis divaricato-ramosis, floribus breviter pedicellatis 6–7-meris, calycis segmentis linearibus petala oblonga tomentoso-ciliata subæquantibus.—*Blackwellia Napalensis,* DC. Prod. vol. ii. p. 54; Wall. Pl. As. Rar. vol. ii. p. 179.—Folia 3–5-pollicaria. Flores parvi, fere *H. paniculati.* Styli 3–4.

Hab. Nepaul, *Wallich.*

2. H. **paniculatum.** Foliis (amplis) petiolatis ovatis orbiculatis suboblongisve integerrimis subdentatisque coriaceis glabris nitidis, paniculis ramosis, floribus breviter pedicellatis 8–12-meris, calycis segmentis petalisque linearibus subæqualibus plumoso-hispidis.—*Blackwellia paniculata,* Lam., DC. Prod. vol. ii. p. 54. *B. integrifolia,* Lam. Ill. t. 412. f. 2; DC. *l. c.*; et (forma angustifolia) *B. glauca,* Vent. Choix, t. 55; DC. *l. c.*—Folia bipollicaria et majora, novella tenuia, adulta crasso-coriacea. Flores parvi eleganter plumosi. Styli 5, v. rarius 6?

Hab. Mauritius, *Bojer* and others.

3. H. **rufescens.** Foliis (parvis) petiolatis obovatis oblongisve submembranaceis nitidis glabris basi angustatis, racemis brevibus paniculatis, floribus pedicellatis 7–8-meris, calycis segmentis linearibus quam petala oblongo-linearia ciliata paullo brevioribus.—*Pythagorea rufescens,* E. Mey. Pl. Dr. exs. *Blackwellia rufescens,* Arn. in Hook. Journ. Bot. vol. iii. p. 149.—Flores parvi fere *H. paniculati.* Folia multo minora et tenuiora, vulgo $1\frac{1}{2}$–2 poll. longa, $\frac{3}{4}$ poll. lata, integerrima, v. sinuato-dentata. Styli 4–5.

Hab. Port Natal, *Drège, Gueinzius.*

** *Racemosa.* Racemis elongatis ad axillas solitariis v. ad apices ramulorum paucis subfasciculatis v. laxe subpaniculatis.

4. H. **axillare.** Foliis subsessilibus ovalibus oblongisve subcrenatis glabris, racemis elongatis, floribus (subsessilibus? 7-meris?), calycis segmentis petalisque linearibus ciliatis subæqualibus.—*Blackwellia axillaris,* Lam. Dict. vol. i. p. 420; et Ill. t. 412. f. 1. An etiam *B. gracilis,* Blum. Mus. Bot. vol. ii. p. 26, floribus pedicellatis?

Hab. Madagascar. I have seen no specimens; nor had Blume, it would appear, seen any authentic ones, of the original plant; and I strongly suspect that the discrepancies which he found between Lamarck's figure and the specimen he received from Paris, and which induced him to publish the latter as new, are owing to inaccuracies of the artist.

5. H. **tomentosum.** Foliis subsessilibus late obovatis repando-subcrenatis supra glabris subtus puberulis tomentosisve, racemis elongatis tomentoso-villosulis, floribus parvis glomeratis subsessilibus 5–6-meris, calycis tubo brevi, segmentis petala oblongo-linearia subæquantibus. *Blackwellia tomentosa,* Vent. Choix, t. 57; DC. Prod. vol. ii. p. 55.

B. spiralis, Wall. in As. Res.; DC. *l. c.* Folia 4–6-pollicaria. Flores in hac et sequente, minimi, numerosi. Styli 3–4.

Hab. Java, also Pegu, *Wallich*. Catal. no. 4897 A. in part.

6. H. LONGIFOLIUM, sp. n. Foliis petiolatis oblongis v. anguste obovato-oblongis subintegerrimis glabris, racemis elongatis tomentosis, floribus parvis glomeratis pedicellatis 6–8-meris, calycis tubo brevi segmentis linearibus quam petala lineari-cuneata vix brevioribus.—Folia 5–6 poll. longa, raro 2 poll. lata, subcoriacea, nitidula.

Hab. Penang, *Phillips*. Distributed also by Wallich with the last, under the name of *B. spiralis*, from the Calcutta Garden, Catal. no. 4897 A.

7. H. ZEYLANICUM. Foliis petiolatis ovali-ellipticis ovatisve acuminatis subdentatis demum coriaceis nitidis glabris, racemis elongatis tomentellis, floribus parvis glomeratis pedicellatis 4–6-meris, calycis tubo oblongo-turbinato, segmentis oblongis quam petala obovali-oblonga ciliata brevioribus.—*Blackwellia zeylanica*, Gardn. in Calc. Journ. Nat. Hist. vol. vii. p. 452. *B. tetrandra*, Wight, Ic. vol. v. t. 1851.—Folia pleraque 3–4-pollicaria, juniora membranacea. Styli 3–4.

Hab. East Indian Peninsula, Pulney Mountains, *Wight*; Concan, *Stocks*; Ceylon, *Walker*, *Gardner*, *Thwaites*.

8. H. AFRICANUM. Foliis breviter petiolatis ovalibus oblongisve dentatis glabris, racemis elongatis, floribus sessilibus glomeratis 5–7-meris, calycis tubo turbinato, segmentis acutis quam petala oblongo-cuneata multo minoribus.—*Blackwellia africana*, Hook. fil. Fl. Nigr. p. 361. —Folia 4–5-pollicaria. Styli 4–5.

Hab. Sierra Leone, *Don*; Lagos, *Barter*.

9. H. FAGIFOLIUM. Foliis breviter petiolatis ovalibus obovatisve dentatis membranaceis pubescentibus v. demum glabratis, racemis elongatis ramulisque pubescentibus, floribus pedicellatis sparsis 6–8-meris, calycis tubo anguste turbinato, segmentis lineari-cuneatis quam petala ciliata paullo minoribus.—*Blackwellia fagifolia*, Lindl. in Trans. Soc. Hort. Lond. vol. vi. p. 269. *B. padiflora*, Lindl. Bot. Reg. t. 1308. *B. Loureiri*, Benth. in Lond. Journ. Bot. vol. i. p. 482. *Astranthus cochinchinensis*, Hook. Bot. Mag. t. 2659 (foliis solito angustioribus), an Lour.?—Folia subtripollicaria. Styli vulgo 4.

Hab. South China. By a misprint, this species is called *B. pubiflora*, Lindl., by Walpers; and it is probably the same one also that Steudel, by some such mistake, has indicated under the names of *B. chinensis* and *B. grandiflora*.

Sectio II. RACOUBEA. Stamina ad quodque petalum 2–7 approximata v. fasciculata. Racemi simplices v. laxe subramosi, sæpius elongati.

* *Americana.*

10. H. RACOUBEA (*Sw.*, *DC. Prod.* vol. ii. p. 53). Foliis ovalibus oblongisve subacuminatis crenato-dentatis glabris nitidis, floribus subsessili-

bus 6–7-meris, calycis segmentis quam petala ovata minoribus, staminibus ad petala ternis, stylis 3 usque ad ovarium villosum distinctis. —*H. surinamense*, Steud. in Flora, 1843, p. 756.—Folia 3–4-pollicaria rarius longiora. Bracteæ et bracteolæ parvæ, sed evidentiores et diutius persistentes quam in 2 sequentibus. Perianthium post anthesin annulatim patens.

Hab. North Brazil and Guiana; on the Solimoes, *Spruce*; Surinam, *Hostmann*, no. 6 & 1053; British Guiana, *Rob. Schomburgk*, 1*st Coll.* no. 225, 2*nd Coll.* no. 883; *Rich. Schomburgk*, no. 1463.

11. H. RACEMOSUM (*Jacq.*, *DC. Prod.* vol. ii. p. 53). Foliis ovalibus oblongisve acuminatis crenato-dentatis glabris nitidis, floribus distincte pedicellatis 6–7-meris, calycis segmentis quam petala ovata paullo minoribus, staminibus ad petala ternis, stylis 3 usque ad ovarium villosum distinctis.—*H. Racoubeæ* valde affinis et vix nisi pedicellis differt. Folia sæpius paullo minora.

Hab. West Indies: Jamaica, *Purdie, Macfadyen*, etc.; Cuba, *Linden*, no. 2108; Guadaloupe, Dominica, Trinidad, etc.

12. H. DENSIFLORUM (*Spruce, Pl. Bras. exs.*). Foliis ovali-oblongis acuminatis crenato-dentatis subcoriaceis glabris nitidulis, floribus sessilibus 5-meris rarius 6-meris, calycis segmentis quam petala ovata pluries minoribus, staminibus ad petala ternis, stylis 3 basi in columnam glabram coalitis.—Folia 4–5-pollicaria. Flores quam in *H. Racoubea* paullo majores. Ovarii pars libera tubo striato æquilonga villosa, in stylum glabrum breviter trifidum abiens. Fructus ut in 2 sequentibus induratus (indehiscens?) medio perianthio patente annulatus.

Hab. Santarem, *Spruce*.

13. H. PEDICELLATUM (*Spruce, Pl. Bras. exs.*). Foliis oblongis acuminatis crenato-dentatis supra nitidis glabris subtus ad costam hirtellis, floribus pedicellatis 6–7-meris tomentellis, calycis segmentis quam petala ovata multo minoribus, staminibus ad petala subquinis, stylis 3 supra ovarium in columnam brevem coalitis.—Differt ab *H. racemoso* uti *H. densiflorum* ab *H. Racoubea* floribus majoribus, stylis basi coalitis et fructu indurato; et ab omnibus præcedentibus staminibus ut in sequente sæpius quinis (rarissime quaternis).

Hab. North Brazil and Venezuela, on the upper Rio Negro abundantly, *Spruce*, nos. 1489 and 3722.

14. H. SENARIUM (*DC. Prod.* vol. ii. p. 54). Foliis breviter petiolatis ovali-oblongis sinuato-dentatis glabris, floribus subsessilibus 6–8-meris dense tomentosis, calycis segmentis oblongis quam petala angustioribus, staminibus ad petala 5–6, stylis 3–4 usque ad ovarium distinctis.

Hab. Mexico, *Jurgensen* (without any no. in Herb. Hook.).

** *Gerontogea.*

15. H. VITIENSE, sp. n. Foliis ovatis vix coriaceis glabris, floribus subsessilibus 8–10-meris, calycis tubo oblongo-turbinato, segmentis linea-

ribus quam petala lineari-cuneata vix minoribus, staminibus ad petala 2–3-nis.—*H. fœtido* certe affine, sed distinctum videtur. Folia 2–3-pollicaria. Flores sessiliores, tubo longiore, calycis segmentis petalisque post anthesin longioribus et minus inæqualibus. Styli sæpius 4.

Hab. Naviti-Leon, one of the Feejee Islands, *Milne*. This species has quite the shuttle-cock flowers of several of the 1st Section.

16. H. FŒTIDUM. Foliis (amplis) ovali-ellipticis suboblongisve crenato-dentatis submembranaceis glabris v. ad costam puberulis, floribus glomeratis brevissime pedicellatis 6–10-meris, calycis tubo breviter turbinato, segmentis anguste linearibus quam petala oblongo-cuneata ciliata paullo brevioribus, staminibus ad petala subgeminis.—*Blackwellia fœtida*, Wall., Deless. Ic. vol. iii. p. 32, t. 53.—Folia 5-8-pollicaria. Racemi elongati tenuiter tomentelli. Flores parvi. Styli 3–4.

Hab. Indian Archipelago, Mergui, *Griffith*; Amboyna, *Roxburgh*; Moluccas, *Wallich*; Celebes, *Miq. Fl. Ned. Ind.*

17. H. ANGUSTIFOLIUM (*Smith, DC. Prod.* vol. ii. p. 54). Foliis subsessilibus anguste oblongis subdentatis glabris, racemis elongatis, floribus sessilibus 5–7-meris, calycis tubo turbinato, segmentis quam petala cuneato-oblonga multo minoribus, staminibus ad petala ternis. —Folia 2–5-pollicaria.

Hab. Sierra Leone, *Herb. Smith.*

18. H. PARVIFOLIUM (*Hook. fil.*). Foliis petiolatis parvis ovali-oblongis acuminatis vix dentatis glabris nitidis, floribus subsessilibus confertis 6–7-meris, calycis tubo breviter turbinato, segmentis post anthesin patentibus oblongis quam petala ovata inflexa sublongioribus, staminibus ad petala subquinis.—Folia 2-pollicaria. Racemus in specimine brevis densiflorus cano-tomentellus. Flores fere sequentis nisi minores. Styli brevissimi.

Hab. Borneo, *Lobb.*

19. H. GRANDIFLORUM, sp. n. Foliis breviter petiolatis amplis oblongis subintegerrimis coriaceis nitidis glabris, floribus pedicellatis 6–7-meris, calycis tubo breviter turbinato, segmentis post anthesin accretis oblongis patentibus quam petala ovata inflexa longioribus, staminibus ad petala sub-7-nis.—Folia pallida, rigida, 5–6-pollicaria. Racemi elongati cano-tomentosi. Flores sub anthesi circa 5 lin. diametro, petalis segmentisque calycinis patentibus parum inæqualibus. Post anthesin calycis segmenta usque ad 5 lin. longa glabriora tenuiora et stellato-patentia; petala paullo accreta supra ovarium arcte inflexa. Styli vulgo 5, breves.

Hab. Malacca, *Griffith.*

20. H. BRACTEATUM, sp. n. Foliis breviter petiolatis amplis ovatis oblongisve dentatis coriaceis nitidis glabris, floribus sessilibus 4-5-meris, calycis tubo breviter turbinato, segmentis post anthesin

ovatis inflexis quam petala obovato-oblonga accreta patentia dimidio brevioribus, staminibus ad petala subternis.—Folia 6–8-pollicaria. Racemi elongati cano-tomentosi. Bracteæ ovatæ concavæ quam in omnibus speciebus majores et diutius persistentes. Flores primo intuitu iis *H. grandiflori* similes, sed paullo minores et petala nec calycis segmenta stellato-patentia, dum hæc uti petala *H. grandiflori* supra ovarium inter petala arcte inflexa sunt.—Styli 4–5.

Hab. Philippine Islands, *Cuming*, no. 1109.

21. H. CARYOPHYLLACEUM. Foliis subsessilibus ovalibus obovatisve subcrenatis coriaceis glabris, floribus subsessilibus 5–6-meris, calycis tubo oblongo-turbinato, segmentis acutis quam petala ovali-oblonga vix brevioribus, staminibus ad petala ternis.—*Blackwellia caryophyllacea*, Zoll. et Mor. Verz. p. 33.—Folia per anthesin pauca supersunt, novella nondum evoluta ex Miq. 3-pollicaria. Racemi breves confertiflori. Flores 2 lin. longi. Ovarii pars libera tubo multo brevior. Styli 3–4.

Hab. Java, *Zollinger*, no. 958.

22. H. CORDYLANTHUS. Foliis breviter petiolatis ellipticis v. oblongis superne dentatis coriaceis glabris, floribus subsessilibus 3–6-meris, calycis tubo elongato, segmentis acutis quam petala ovali-oblonga paullo brevioribus, staminibus ad petala 3–4.—*Cordylanthes frutescens*, Blume, Mus. Bot. vol. ii. p. 28. t. 3. *Blackwellia longiflora*, Miq. Fl. Ned. Ind. vol. i. p. 715.

Hab. Java, *Blume*. I have not seen this plant. From Blume's description, it scarcely differs from the *H. caryophyllaceum* except in the still longer tube of the calyx.

Species dubiæ v. excludendæ.

ASTRANTHUS COCHINCHINENSIS, Lour. Fl. Cochinch. p. 225 (*Blackwellia cochinchinensis*, Bl. Mus. Bot. vol. ii. p. 27), is probably not distinct from *H. fagifolium*.

BLACKWELLIA MOLUCCANA, Bl. Mus. Bot. vol. ii. p. 27, founded upon the figure and description in Rumphius, Amb. vol. iii. p. 25. t. 11, appears to me scarcely to belong even to the order.

PYTHAGOREA COCHINCHINENSIS, Lour. Fl. Cochinch. p. 244, has been supposed to belong to *Blackwellia*, but nothing certain can be made out of his description. The "germen medium inter calycem et corollam" and "Capsula 4-locularis polysperma" are quite discordant with any *Homalineæ*.

BLACKWELLIA CERASIFOLIA, Vent., DC. Prod. vol. ii. p. 54, has an entirely free ovary, with the placentas extending to the base of the cavity. It cannot therefore remain in *Homalium*. It is probably the Madagascar genus with a free ovary, alluded to by Brown.

On East Indian *Salices*. By Dr. N. J. Andersson, Professor of Botany in the University of Stockholm. Communicated by Dr. J. D. Hooker, F.R.S., F.L.S.

[Read June 16, 1859.]

In the Transactions of the Royal Swedish Academy of Sciences (Kongl. Wet. Akademiens Handlingar), 1850, pp. 465–502, I have already given a Synopsis of the Willows then known from the East Indies. Before that time, Roxburgh ('Plants of the Coast of Coromandel,' 1795) had described and figured *S. tetrasperma*; Don ('Prodromus Floræ Nepalensis,' Lond. 1825), *S. disperma*, *S. cuspidata*, and *S. japonica*; Fries (Nov. Fl. Suec. Mont. i., 1832) *S. nobilis* and *S. lenta*; and Wallich ('A Numerical List of Dried Specimens of Plants,' &c.) enumerated *S. Lindleyana*, *S. obovata*, *S. elegans*, *S. grisea*, *S. Kamanensis*, *S. eriostachya*, *S. pyrina*, *S. glabrescens*, *S. urophylla*, *S. calophylla*, *S. densa*, and *S. babylonica*.

During a tour to the Continent and England, in the year 1850, I had opportunity to examine almost all these species: at Berlin I determined the few forms brought from the Himalaya by W. Hofmeister in the expedition of Prince Waldemar of Prussia; in Paris I saw the collections of Jacquemont and Perrottet; and in London Mr. Kippist gave me a liberal access to the East Indian herbarium of the Linnean Society. Upon those materials was that Synopsis founded. I there gave diagnoses and descriptions of twenty-five species, to which were added a few "incertæ" and "dubiæ."

Now, having been so fortunate as to make use of the extremely rich collections formed in that vast land, and in the higher regions of the Himalaya mountains by Dr. J. D. Hooker and Dr. T. Thomson, of which the *Salices* were handed over to me by the generosity of Sir William Hooker and Dr. Hooker, I not only have had occasion to review the previously published determinations, but also to describe a very considerable number of new forms.

The species proposed in this paper are as follow:—

I. Amerina.

* *Polyandræ.*

1. **S. tetrasperma**, *Roxb.*
    - *S. pyrina*, Wall.
    - *S. urophylla*, Lindl.
    - *S. suaveolens*, Ands.
    - *S. ichnostachya*, Lindl.
    - *S. nobilis*, Fr.
2. **S. calostachya**, *Ands.*
3. **S. apiculata**, *Ands.*
4. **S. glaucophylla**, *Ands.*

*** Fragiles, diandræ.*

5. S. dealbata, *Ands.*
6. S. sericocarpa, *Ands.*
7. S. babylonica, *L.*

II. HELICES.

8. S. pycnostachya, *Ands.*
9. S. oxycarpa, *Ands.*
10. S. eriostachya, *Wall.*

III. VETRICES.

** Amentis ♀ sessilibus nudis.*

11. S. daphnoides, *L.*, indica.
12. S. insignis, *Ands.*
13. S. viminalis, *L.*
14. S. Smithiana, *Willd.*
15. S. populifolia, *Ands.*

*** Amentis pedunculatis.*

16. S. eriophylla, *Ands.*
17. S. Daltoniana, *Ands.*
18. S. longiflora, *Wall.*

IV. CAPREÆ.

** Cinerascentes, stylo nudo.*

19. S. Caprea, *L.*
20. S. julacea, *Ands.*
21. S. Wallichiana, *Ands.*

*** Virescentes, stylo producto.*

22. S. hastata, *L.*
23. S. elegans, *Wall.*
24. S. myrtillacea, *Ands.*

V. FRIGIDÆ.

25. S. sclerophylla, *Ands.*
26. S. myricæfolia, *Ands.*
27. S. fruticulosa, *Ands.*

VI. GLACIALES.

28. S. flabellaris, *Ands.*
29. S. Thomsoniana, *Ands.*
30. S. calyculata, *Hook. f.*
31. S. Serpyllum, *Ands.*
32. S. Lindleyana, *Wall.*
33. S. oreophila, *Hook. f.*
34. S. secta, *Hook. f.*

By this enumeration it may be seen that there are five European species also found in the East Indian Alps, viz. *S. daphnoides*, *S. viminalis*, *S. Smithiana*, *S. Caprea*, and *S. hastata*. But, with the exception of *S. hastata*, all the others have been determined upon a few and scarcely complete specimens. Of the rest, *S. babylonica*, *S. dealbata*, *S. glaucophylla*, and *S. sericocarpa* truly are allied to the species (*S. acmophylla*, *S. babylonica*, and *S. octandra*) of Western Asia; *S. tetrasperma* proves to be the form most peculiar to the East Indies, where it offers a great variety of interesting forms, quite as, in our own country, *S. pentandra*, with which it is somewhat analogous. *Helices*, indeed, differ from our species, although *S. pycnostachya* seems to belong to the series of *S. purpurea*, and *S. eriostachya* to that of *S. rubra*. Amongst *Vetrices*, the groups of *S. daphnoides* and *S. viminalis* are each represented by three or four species; and of *Frigidæ* and *Glaciales*, all seem to be peculiar to the Himalayan mountains.

1. Salix tetrasperma, *Roxb.* S. amentis lateralibus pedunculatis, masculis longis laxis rarifloris, femineis cylindricis subdensifloris elongatis, pedunculo foliis 3–6 instructo; squamis oblongo-spathulatis griseo-puberulis; nectario pedicello sexies breviore; capsula longe pedicellata ovata glabra, stylo minimo, stigmatibus divisis; foliis ovato-lanceolatis elongatis longe acuminatis subtus plerumque glaucis integerrimis.

S. tetrasperma, *Roxb. Pl. of the Coast of Coromandel,* i. p. 66. tab. 97; *Wallich, Catalog. Pl. Ind. oriental.* no. 3707; *Ands. Ostindiens Pilar* (*Acta Holm.* 1850, p. 484. no. 14).—S. Hugelii, *Wimm. herb. Berol.* —S. nilagirica, *Miquel* (*Hohenacker, Pl. Indiæ or.* 1851).

Hab. Ad ripas et in locis humidis per totam (Indiam orientalem?) Nepaliam, ut videtur subfrequens. In montibus Nilagiri, Khasia reg. trop. alt. 2–4000 ped. (*Hook. et Thomson*). Nullam aliam se invenisse monet Roxburgh. Tempore frigido floret.

Hæc *Salix* formis numerosis (ut e collectione ditissima ill. *J. D. Hookeri* certior factus sum) mire ludit, et centrum, ut ita dicam, efficit *Salicum* Indiæ orientalis vere indigenarum et huic terræ propriarum; quare sequentes, a forma typica plus minus recedentes, meras varietates censeo.

**S. pyrina,* Wallich (Catal. n. 3705). Amentis breviter pedunculatis subrarifloris acutiusculis excurvatis, pedunculo paucifoliato, squamis subdeciduis spathulatis cinerascenti-pilosis; nectario pedicello capsulæ quadruplo breviori; capsula ex ovata basi attenuata, stylo subnullo; foliis lanceolatis acutis subtus cinereis.—Ands. *l. c.* p. 486. no. 15.

Hab. In Nepalia (*Perrottet, Wallich*).

** *S. urophylla,* Lindl. (Herb. Soc. Linn.). Amentis foliis parvis suffultis arrectis curvatis obtusiusculis; squamis incano-pilosis; capsulis ovato-lanceolatis glaberrimis, pedicello nectarium bis terve superante, stylo brevi, stigmatibus bipartitis excurvatis; foliis glabrescentibus lanceolatis.—Wallich, Catal. no. 3708; Ands. *l. c.* p. 487. no. 16.

Hab. Ind. orient., Oude (*Wallich*).

*** *S. suaveolens* (Ands. *l. c.* p. 491. no. 19). Amentis ♂ suaveolentibus pedunculatis strictis elongatis, pedunculo foliato; squamis latissime ovatis convexis aureo-fulvis hirsutie densa albo-tomentosis, apice summo nudis; staminibus 8–10, filamentis tenuissimis inferne barbatis, antheris globosis; foliis e basi subovata longissime acutatis glaberrimis subtus glaucescentibus, coriaceis.—*S. Myurus,* Wimm. (herb. Vindob.).

Hab. Ad Ajnir leg. *V. Jacquemont* (Voyage aux Indes or., no. 96). Himalaya, *Hugel,* no. 526.

**** *S. ichnostachya* (Lindl. hb. Wight.). Amentis pedunculatis, masculis patentibus, pedunculo foliis 2–4 instructo; squamis ovato-rotundatis dense crispo-villosis; stam. octo, filamentis basi barbatis;

foliis lanceolatis acutato-acuminatis integerrimis subtus glaucis.—Wall. Cat. no. 3702; Ands. *l. c.* p. 488. no. 17.

Hab. Ad Karikal, prope Pondichery (*Perrottet*), Nepalia (*Wallich*).

***** *S. nobilis*, Fr. Amentis subpedunculatis erectis, foliis minutis deciduis bracteatis, fem. subdensifloris, masc. rarifloris; squamis parvis rotundatis dorso glabriusculis; capsulis ovato-subulatis sæpius glabris, pedicello nectarium superante, stylo longissimo, stigmatibus fissis linearibus; foliis oblongo-lanceolatis adpresse serrulatis glabratis lucidis.—Ands. *l. c.* p. 492. no. 20.

Hab. In Nepalia (*Wall. herb. Hornem.*).

Descriptiones completiores harum omnium formarum in Act. Holm. *l. c.* jam prius dedimus.

Ad hanc speciem eximie polymorpham forsan etiam pertinent sequentes, de quibus autem valde dubitans sum:

(1.) *S. disperma*, Don (Prod. Fl. Nepal. p. 58). "Octandra: amentis masculis prælongis villosis; squamis obtusis; ovariis ventricosis tomentosis, stigmatibus 2 linearibus apice incrassatis emarginatisque; foliis ellipticis integerrimis mucronatis utrinque ramulisque sericeo-villosis."—Roxb. MSS.; Ands. *l. c.* p. 500. no. 26.

Hab. In Nepalia (*Hamilton*).

(2.) *S. lenta*, Fr. (Nov. Fl. Suec. Mont. i. p. 78). "Foliis lanceolatis remote glanduloso-dentatis subtus villosulis canescentibus, stipulis lanatis, amentis subpedunculatis, bracteis deciduis, masc. arcuatis diandris (?), capsulis pedicellatis subulatis sericeis, stylo brevi, stigmatibus emarginatis."—Ands. *l. c.* p. 501. no. 28.

Hab. Etiam in Nepalia.

(3.) *S. calophylla*, Wall. *l. c.* no. 9102; Ands. *l. c.* p. 502.

(4.) *S. densa*, Wall. *l. c.* p. 9103; Ands. *l. c.* p. 502.

(5.) S. ——, Wall. *l. c.* no. 9105; Ands. *l. c.* p. 502.

(6.) *S. pseudogrisea*, Steudel (*S. grisea*, Wall. no. 3700 D, herb. Berol. et Vindob.).

2. S. CALOSTACHYA, *Ands.* (*l. c.* p. 489. no. 18). Amentis sessilibus longe cylindricis flexuosis densifloris; squamis parvis fulvis, pilis albido-griseis hirsutis, pedicello brevioribus; nectario minutissimo; capsula pedicellum elongatum filiformem æquante glabra, stylo nullo, stigmatibus erectis; foliis ovato-lanceolatis undulatis subtus argenteis glaucis.

Hab. In sylvis humidis, 2000 metr. elevatis Indiæ orient. a Kahouta ad Mahabad (*Jacquemont*, *Voy.* no. 250).

Descriptionem in Act. Holm. *l. c.* vide.

3. S. APICULATA, *Ands.* (*l. c.* p. 470. no. 1). Amentis pedunculatis erectis, foliis paucis suffultis, fem. subdensifloris; squamis caducis, apice obtuso, glabriusculis; capsulis conicis glabris, pedicello nectarium unicum bis superante, stylo mediocri, stigmatibus

divisis; foliis ovato-lanceolatis, apice longe producto, acuminatis nitentibus.

S. cuspidata, *D. Don, Prodr. Fl. Nepal.* p. 58; *Wallich, l. c.* no. 3703.

Hab. Sirinagur (*D. Kamroop*), Nilgherry (*Noton*).

Descriptionem in Act. Holm. *l. c.* dedi.—Nonne autem *S. tetraspermæ* varietas?

4. S. GLAUCOPHYLLA, *Ands.* (*l. c.* p. 474. no. 7). Amentis foliato-pedunculatis erectis, femineis cylindricis rarifloris obtusiusculis; squamis subpersistentibus ovatis dense albo-villosis; nectario lato pedicello capsulæ quadruplo breviori; capsula pedicellata globoso-conica acuta glaberrima; stylo subnullo, stigmatibus brevibus; foliis elongato-lanceolatis glaberrimis integerrimis subtus glaucis.

Ex India orientali reportavit *Jacquemont.*

Hæc species *S. octandræ* (Sieb.) sine ullo dubio valde affinis est, quæ tamen sat aperte differt: amentis crassioribus magisque densifloris, capsulis brevioribus, necnon foliis vulgo latioribus, serratis, subconcoloribus.

Descriptionem in Act. Holm. *l. c.* vide.

5. S. DEALBATA, *Ands.* (*l. c.* p. 472. no. 1). Amentis pedunculatis brevibus obtusis subdensifloris; pedunculo 1–3-foliato; squamis deciduis obovatis pubescentibus; nectario lato brevi subbifido; capsula pedicellata ovato-conica, glaberrima; stylo mediocri, stigmatibus erectis; foliis lanceolato-linearibus integerrimis subtus glaucescentibus demum dealbatis.

Hab. Inter Saharnpora et pedem montium Sulin Nauka et Mohur; in planitie secus torrentem ad Ghautka-ware (*Jacquemont*).

Descriptionem in Act. Holm. *l. c.* vide.

Habitu *S. albæ* v. *babylonicæ*, a quibus differt foliis omnino glaberrimis, sensim angustatis nec ita acuminato-productis, amentis brevioribus, capsulis evidenter pedicellatis. Magna etiam cum *S. acmophylla* Boiss. est affinitas, quæ tamen amentis globosis, densifloris, squamis glabriusculis et capsulis quodammodo differt. Tribus autem *S. albæ* et *babylonicæ* in Asia occidentali vere indigena ibi magis quam apud nos variis ludit formis.

6. S. SERICOCARPA, *Ands.* Amentis breve pedunculatis foliis parvis suffultis angustis elongatis flexuosis; squamis concoloribus glabris lineari-spathulatis; stam. geminis; capsulis sessilibus tenuiter sericeis conico-rostratis stylo producto bifido, stigmatibus integris erectis; foliis anguste lanceolatis utrinque glaberrimis apice producto subobliquis integris subtus glaucescentibus.

Hab. Kaschmir, reg. alp., alt. 6000 ped. (*Thomson*).

Arbor videtur, ramis erectis, subvimineis, cortice fusco-castaneo glabro obductis. Folia 2–3 pollices longa, vix semipollicem lata, basi attenuata, apice angustato-cuspidata, supra viridia, subtus læte glauca, utrinque glaberrima, margine integerrima vel rarius minute serrulata. Amenta lateralia, pedunculo semipollicari insidentia, patentia, foliis 2–7 parvis integris oblongis suffulta; mascula 1½ pollicem longa, rectiuscula, rachi hirsuta, squamæ testaceo-pallidæ, stamina gemina, filamentis squamas subtriplo superantibus glabris filiformibus, antheris minutis flavis; am. fem. laxe flexuosa, 2–3 pollices longa, rachis hirsuta, squamæ obtusiusculæ apice fusciores, capsulæ lineam longæ conicæ tenuiter incano-sericeæ, nectario ventrem capsulæ tegente, stylo luteo ad medium fisso, stigmatibus infuscatis.

Primo obtutu, *S. albæ* nostræ similis, abunde autem differt capsulis et squamis, necnon foliis.

7. S. BABYLONICA, *L. Sp. Pl.* 1773; *Ands.* (*l. c.* p. 472. no. 2); *Don, Prodr. Fl. Nep.* p. 59.—S. japonica, *Thbg.*, *Ands.* (*l. c.* p. 501. no. 27).

Hab. Kera, Tunbury, *Jacquemont*; Narainhetty Nepaliæ, *Hamilton*.

8. S. PYCNOSTACHYA, *Ands.* Amentis sessilibus foliis nullis suffultis; staminibus monadelphis, antheris quadrilocularibus; squamis arctis obtusiusculis apice fuscioribus basi pilosis; capsulis sessilibus ovatis glabris, stylo subnullo, stigmatibus brevibus erectis bifidis; foliis lanceolatis obtusis basi angustatis planis integerrimis utrinque glabris vel junioribus subtus præsertim sericeis.

Hab. In India orientali: Gauskar, reg. alp., alt. 13,000 ped. (*Thomson*).

Frutex fere orgyalis. Rami ramulique divaricati, cortice atro-violaceo obsolete glaucescenti-irrorato lucido obducti. Stipulæ obsoletissimæ aut cito caducæ. Folia fere 2 pollices longa, supra medium vix semiunciam lata, basin versus sensim angustata, apice obtusata, omnino plana, submollia, margine integerrima, juniora pilis brevibus adpressis utrinque albo-sericea, adulta glabrata, utrinque læte viridia costa dilutiori venisque ex siccatione fuscescentibus rectiusculis subsimplicibus percursa; petiolus 2½ lin. longus, puberulus. Gemmæ ovato-rotundatæ, fusco-castaneæ, omnino glabræ. Amenta lateralia præcocia, arrecto-patentia, pedunculo 2–3 lin. longo villoso insidentia, bracteis minimis dense tomentosis suffulta, densiflora, obtusa. Amenta mascula, 1½ pollicem longa, cylindrica, rachis hirsuta; squamæ spathulato-obovatæ filamentum ad medium tegentes, brunnescentes, pilis longis albidis conspersæ; filamenta duo concreta pallide flava, basi parcissime pilosa; anthera quadrata aurea. Amenta fem. excurvata, 1½–2 pollices longa, cylindrica vel apicem versus fere incrassata, valde densiflora; rachis pilosa; squamæ obovato-rotundatæ basi fulvescentes, pilis longis hirsutæ, supra medium castaneo-fuscæ, glabræ vel pilis pallidis ciliatæ, capsulis plus quam duplo breviores; nectarium punctiforme, glabrum, pilis conditum, basin capsulæ vix attingens; capsula sessilis, 1⅓ lin. longa, ovato-oblonga, basi gibba, acutiuscula; stylus brevissimus in stigmata brevia bipartita arrecta cyathi instar dilatatus, flavus.

Est in tribu sua habitu prorsus peculiari, hinc ad *S. rubram*, staminibus monadelphis, foliis lineari-lanceolatis, interdum sericeo-pubescentibus, illinc ad *S. daphnoidem*, nempe amentis sessilibus valde densifloris, capsulis glabris viridulis et ramis adultis nonnunquam glauco-irroratis, accedens. Sed ab utraque magnopere differt; a *S. rubra* foliis non longe productis obtusis integerrimis, planis, stipulis nullis, capsulis glabris, stylo brevi et stigmatibus crassis; a *S. daphnoide* foliis, stigmatibus et stylo necnon staminibus.

9. S. OXYCARPA, *Ands.* Amentis lateralibus præcocibus sessilibus elongatis laxe flexuosis; staminibus 2, filamentis ad medium connatis; capsulis sessilibus conico-elongatis acutis sericeo-puberulis, stylo subnullo, stigmatibus brevissimis subclavatis; foliis lanceolatis acutiusculis tenuibus, adultis rigidis glabre nitentibus, subintegris subtus glaucescentibus.

Hab. Kischtwar, reg. temp. alt. 6–11,000 ped. (*T. Thomson*).

a. angustifolia: foliis anguste lanceolatis subtus glaucescentibus, squamis capsularum acutiusculis fuscis.

b. latifolia: foliis late lanceolatis v. oblongis subtus pallidioribus, squamis caps. rotundatis fulvescentibus.

Frutex plus quam orgyalis. Rami erecti, crassiusculi, in speciminibus masculis a me visis molliter incano-pubescentes, brunnei, in spec. fem. omnino glabri, rufescentes. Gemmæ minutissimæ, acutiusculæ, sero evolutæ. Stipulæ anguste lanceolatæ, petiolo lineam longo vix longiores, plerumque mox caducæ. Folia 3 pollices longa, pollicem lata, supra medium nonnihil latiora, ceterum æqualiter attenuata, plana, margine integra vel apicem versus minute et remote glanduloso-serrulata, juniora pellucida, pilis nitentibus adpressis præsertim secus costam obtecta, demum utrinque glaberrima vel infra obsoletius puberula, supra læte viridia, subtus opace glaucescentia, costa sola distincta; petiolus lineam longus, cano-tomentosus; folia novella oblonga, obtusa, pilis adpressis plus minus dense obtecta. Amenta lateralia, præcocia, pedunculo 3 lineas longo vel immo breviori insidentia, bracteis 2–4 vix unciam longis subtus sericeis oblongis vel obovatis suffulta. Amenta mascula patentia vel immo subrecurvata, crasse cylindrica, obtusa, densiflora, 2 pollices longa; rachis hirsuta; squamæ staminibus triplo breviores, obovato-rotundatæ, fusco-castaneæ, pilis cinereis squamarum longitudine corrugatis ciliatæ; stamina 2, filamentis usque ad medium connatis glabris flavis, antheris subrotundatis aureis. Amenta feminea arrecta vel laxissime patentia et curvato-flexuosa, 3–4 pollices longa, acutiuscula; rachis pubescens; squamæ ut in am. ♂ sed pallidiores, capsulis quadruplo breviores; nectarium squama triplo brevius, glabrum; capsula sessilis, ex ovata basi conico-attenuata, fere 2 lin. longa, apice acutata, tomento sericeo tenui pubescens, stylo parvo sed distincto, stigmatibus brevibus integris crassiusculis erectis.

Quoad folia hæc salix pulcherrima *S. phylicæfoliæ* vel potius *S. laurinæ angustifoliæ* simillima videtur; amenta feminea non ab iis harum specierum multum aberrant; adsunt autem capsulæ sessiles stylo minuto rostratæ; præterea stamina monadelpha? Cum speciebus ad Helices vulgo relatas hæc nostra ceterum parum habet commune. E *S. cinerea* et *S. laurina* quasi composita videtur! Et ob id *S. julacea* nostra huic quam maxime affinis; quæ tamen differt foliis frequentius hirsutis vel sericeis, capsulis adhuc longius attenuatis et stigmatibus prorsus sessilibus.

Huc sine dubio ea Salicis species referenda est, quam nomine *S.* (*phylicæfolia*) *macrocarpa*, *l. c.* p. 449. no. 11, "in frigidis umbrosis et fertilibus a Stari ad Korenass," lectam a Jacquemont, fusius descripsi. Cui etiam forsitan est associanda *S. glabrescens* Lindl. "in Oude et Rohilcund," Wallich (Catalog. no. 3706).

a. breviuscula amentis fere duplo brevioribus; capsulis tomento sericeo tenuiori parcius puberulis, demum fere glabratis; foliis anguste lanceolatis, margine sæpius remote serrulatis, utrinque glabris, subtus glaucescentibus.

Hab. Janskar, reg. alp., alt. 10–17,000 ped. (*Thomson*).

Non absque hæsitatione permulta hanc formam *S. oxycarpæ* subsumendam suspicor. Recedit quidem foliis, ramis angustioribus cortice fusco obductis, totoque habitu, nullis autem notis amentorum et capsularum ab ea distingui potest. Ad *Salicem rubram* foliorum forma nonnihil appropinquat.

b. serratifolia: foliis 3-pollicaribus exacte lanceolatis cuspidato-productis, venis et costa flavescentibus elevatis pulchre et regulariter striatis, subtus intense glaucis, margine minute sed satis acute glanduloso-serrulatis; amentis (defloratis) 4–5 pollices longis, laxissimis.

Hab. Linla, reg. temp., alt. 8000 ped. (*Thomson*).

Quoad folia hæc speciei forma *S. daphnoidi* ita est similis, ut ab ea non nisi amentis longissimis, breve sed distincte pedunculatis et foliis parvis suffultis, capsulis breve pedicellatis, conico-rostratis, squamis denique testaceis glabriusculis differt.

10. S. ERIOSTACHYA, *Wall.* (*l. c.* no. 3704). Amentis lateralibus, femineis densifloris; pedunculis foliatis; squamis obovato-rotundatis pilosiusculis; nectario ventrem capsulæ attingente; capsula sessili ovato-conica albo-villosa, stylo elongato, stigmatibus bipartitis; foliis subovalibus obtusiusculis integerrimis subtus glaucis.—*Ands. l. c.* p. 493. no. 21. Descriptionem *l. c.* etiam vide.

Hab. In Nepalia, ad Gossain Than.

Distinctissima species ob amenta capsulasque cum nulla alia confundenda. Foliis tamen cum *S. daphnoide*, amentis cum *S. rubra* nonnihil commune habet.

11. S. DAPHNOIDES, *L.*; V. INDICA, *Ands.* (*l.* c. p. 475. no. 5).

Hab. In summa valle Jumnath, supra fontem thermalem, 2500–3300 metr. alt. (*Jacquemont*).

Specimina hic lecta a vera *S. daphnoide* non parum discrepant: amentis magis excurvatis, squamis longioribus acutatis, stylo valde producto, foliisque utrinque viridibus, tenuioribus.

Alia ad "Banhatta, 2952 metr." etiam a Jacquemont lecta, cum *S. daphnoide* subbene congruunt.

12. S. INSIGNIS, *Ands.* Amentis sessilibus e gemmis magnis erumpentibus basi nudis, masculis crassis, squamis atris flavescenti-pilosis, staminibus geminis; femineis laxe erectis elongato-cylindricis acutiusculis, squamis atris obtusis glabriusculis, capsulis breve pedicellatis conicis sericeis, stylo evidenti, stigmatibus crassiusculis erectis; foliis lanceolatis tenuiter serratis rigidis subtus glaucescentibus, stipulis semicordatis acutis persistentibus.

Foliis latioribus glabris.

Hab. Kaschmir, reg. temp., alt. 6–8000 ped. (*Thomson*).

Foliis angustioribus, longius acuminato-cuspidatis, utrinque cinereo-tomentosis.

Hab. Tibet. occident., reg. temp., alt. 6–8000 ped. (*Thomson*).

Arbor vel frutex videtur sat altus. Rami validi, cortice rufo-fusco vel castaneo glabro nitente rarissime glaucescente obducti. Gemmæ ovato-conicæ apice acuto incurvæ intrafoliares pedunculo subduplo breviores fusco-castaneæ glabræ vel hirsutie parca puberulæ, floriferæ late ovatæ 2–3 lineas longæ glabræ castaneæ. Folia 3 pollices longa, ad medium pollicem lata, exacte lanceolata, basi et apice æqualiter angustata, margine glanduloso-serrata serraturis subdepressis, supra læte viridia nitentia costa et venis regulariter arcuatis dilutioribus percursa, subtus pallidiora vel glaucescentia costa et venis striata; pedunculus 2 lin. longus, basi dilatatus gemmam amplectens. Stipulæ semi-ovatæ vel late lanceolatæ basi obsolete cordatæ, longissime cuspidatæ, erectæ, latere exteriori arcuato minute serrulatæ, glabræ vel hirsutæ. Amenta mascula pollicem longa ovato-oblonga vel oblongo-ovalia, omnino sessilia, foliis vel bracteis nullis sed perulis magnis sat diu persistentibus suffulta; squamæ ovato-ovales, obtusæ, aterrimæ, pilis longis cinereo-flavescentibus utrinque sericeæ; stamina gemina, squamas triplo superantia, filamentis flavis, antheris minutis fulvescentibus. Amenta feminea etiam sessilia foliis nullis sed bracteis paucis et parvis villosis suffulta, cylindrica apicem versus angustiora laxe flexuosa, sæpe 2 pollices longa, 2–3 lin. lata; squamæ lanceolatæ acutiusculæ atræ, pilis paucis et brevissimis vel plane nullis basi conspersæ; capsulæ anguste conicæ rostratæ, tenuiter griseo-sericeæ, pedicello nectarium bis superante pallido, stylo parum producto sed conspicuo etiam pallidiori, stigmatibus crassis integris erectis.

Hæc species ex habitu ad *S. daphnoidem* aperte pertinere videtur præsertim quoad folia, gemmas et stipulas, amenta etiam mascula illius sat similia sunt; differt autem amentis femineis longis laxis, squamis atris nudis nec longe pilosis, capsulis evidenter pedicellatis. Eo respectu, ut etiam stylo minuto et amentorum habitu ad Capreas vergit.

13. S. VIMINALIS, *L. Sp.* 1448; *Ands. l. c.* p. 475. no. 6.
Hab. A Castris ad Hirpour (*Jacquemont*).

14. S. SMITHIANA, *Willd. Enum. H. Berol.* ii. p. 1008.
Hab. Sikkim, reg. temp., alt. 5–8000 ped. (*J. D. Hooker*).
Specimen tantum foliiferum in herb. Hooker. vidi, quod non sine dubio ad hanc speciem referendum puto.

15. S. POPULIFOLIA, *Ands. l. c.* p. 497. no. 22. Amentis sessilibus densifloris cylindricis obtusis foliis minoribus bracteatis; squamis oblongis tomentosis; nectario minuto pedicellum brevissimum capsulæ superante; capsula subsessili globoso-conica albo-lanata; stylo nullo, stigmatibus cruciatis; foliis longissime petiolatis ovalibus tenuibus glabrescentibus acute crenatis.
Hab. In India orientali legg. *Perrottet et Jacquemont.*
Descriptionem in Actis Holm. *l. c.* dedi.

16. S. ERIOPHYLLA, *Ands.* Amentis breve pedunculatis subcoætaneis foliis parvis suffultis; capsulis sessilibus obtusis tomento albescenti lanatis squamas villosas quadruplo superantibus; stylo profunde bipartito, stigmatibus bifidis erectiusculis fuscis; foliis lanceolatis acutis subtus argenteo-tomentosis margine dentatis supra rugose venosis.
S. psilostigma, Ands. *l. c.* p. 496. no. 23.
Hab. Khasia, reg. temp., alt. 4–5000 ped. (*J. D. Hooker et Thomson*).
In collectione Jacquemontii Parisiis vidi, sed tantum specimina manca.
Frutex sat altus, facie omnino *S. viminalis.* Rami dense foliati, cortice fusco-cinerascente glabro (in ramis floriferis) vel tomentoso (in ramis foliatis) obducti. Folia novella subtus adpresse argenteo-villosa costa prominula, supra obscure viridia parce pilosa, margine integro exsiccatione revoluta, exacte lanceolata, etiam basi æqualiter angustata; adulta $2\frac{1}{2}$–4 pollices longa, petiolo lineam longo basi dilatato breve petiolata, erecto-patentia, infra medium subovata, inde longius attenuata, apice recto acuta, margine angustissime subrevoluto dense sed non profunde denticulata, subtus tomento non plane adpresso opace argenteo plerumque micante densissime vestita, costa lata pallidiore et venis distinctioribus prominulis percursa, supra saturate viridia tomento raro adpresso sub lente distincto mollia, costa pallidiori medio lineata venis lateralibus ante marginem incurvatis medio partitis impressis rugosa. Stipulæ in ramis vegetis et surculis persistentes, ex ovata vel etiam subcordata basi acutatæ, 3–4 lin. longæ, infra medium 2–3 lin. latæ, subobliquæ, nervis impressis rugosæ, margine subreflexo dentato, subtus albo-tomentosæ. Gemmæ ovato-globosæ, cano-hirtæ, petiolum (a quo basi inclusæ sunt) longitudine æquantes. Amenta lateralia pedunculo semipollicari insidentia, arrecta vel incurvato-patentia; folia bracteantia 4–5 minuta plerumque semipollicaria, apicem versus latiora, ceterum foliis novellis similia. Amenta mascula pollicaria,

rectiuscula, anguste cylindrica, densiflora, e basi primo florentia, obtusa; rachis hirsuta; squamæ obovato-rotundatæ, castaneo-fulvescentes, utrinque sed extus longius albo-villosæ; stamina 2, squamas duplo tantum superantia; filamenta tota pilis albis hirta; antheræ parvæ aureæ. Amenta feminea $1\frac{1}{2}$–2-pollicaria, patentia, rectiuscula v. subflexuosa, anguste cylindrica, obtusa, densiflora; rachis cinereo-tomentosa; squamæ capsulis fere duplo breviores, pallide fuscæ, obovato-rotundatæ, extus pilis albescentibus sat longis villosissimæ; nectarium porrectum, capsulæ dimidia longitudine, glabrum, fuscum, truncatum; capsula vix semilineam longa, ovato-conica obtusissima v. subglobosa, omnino sessilis, pilis albis opace sericeo-micantibus densissime vestita; stylus fuscus fere usque ad basin partitus et pilis capsulæ fere obtectus; stigmata in singulo stylo duo, testacea, stylis triplo breviora, divaricata.

Quod ad folia hæc species *S. viminalem* v. *stipularem* valde simulat; fabrica autem amentorum longissime ab ea differt.

17. S. DALTONIANA, *Ands.* Amentis pedunculatis foliis bracteatis longissimis laxiusculis; squamis capsulas ultra medium tegentibus pilosis; capsulis primo sericeis demum glabratis conico-rostratis sessilibus; stylo longissimo bipartito; stigmatibus filiformibus; foliis lanceolatis integris vel minutissime glanduloso-serrulatis planis supra demum glabris subtus ferrugineo-sericeis.

Hab. Sikkim, reg. temp., alt. 9000–14,500 ped. (*J. D. Hooker*).

Arbor haud excelsa videtur. Rami strictiusculi, cortice atro-piceo glabro obducti; ramuli cinerei parcissime puberuli. Folia juniora pollicaria, late lanceolata, utrinque hirsuta sed præsertim subtus lucide sericea, adulta 3–7 pollices longa, in medio pollice sublatiora basi et apice acuta, superne obscure viridia costa venisque parallelo-arcuatis impressa cinerea, ceterum glabra nitentia, subtus tomento adpresso cinereo-cupreo rufescentia, costa subelevata, margine aut integerrima aut serraturis minutis et sat remotis glanduligeris obscure denticulata; petiolus 2–3 lin. longus cinereo-pubescens. Stipulæ nullæ persistentes. Gemmæ parvæ hirsutæ. Amenta lateralia pedunculata; pedunculus foliis 3–5, ceteris duplo minoribus, basi subrotundis instructus. Amenta mascula erecto-patentia, fere bipollicaria, 2 lin. crassa, rachis incano-pilosa; squamæ cuneatæ, dorso glabræ nervosæ, staminibus duplo triplove breviores, fulvescentes; stamina gemina, filamentis ad medium dense hirsutis, fulvis; antheris rotundatis, aureis. Amenta feminea erecto-patentia, demum 4–6-pollicaria, laxiuscula, subdensiflora, acuta; squamæ spathulatæ, subcastaneæ, pilis griseis hirtæ, capsulæ dimidiam mediam inferiorem tegentes, demum ea quadruplo breviores; nectarium basin capsulæ attingens; capsula fusco-rufescens, conico-acutata, pilis brevibus adpressis primo sericea, demum calva; stylus piceus, valde elongatus (longitudine capsulæ), ad medium fissus; stigmata divaricata, brevissima, pallidiora.

Variare videtur foliis anguste lanceolatis utrinque attenuatis (fere ut in

S. viminali) et fol. ovalibus, basi subrotundatis (fere ut in *S. Smithiana*). Nulli formæ Salicis cujusdam europeæ similis, a *S. viminali* et affinibus longissime recedit annulis pedunculatis; a *S. phylicifolia* capsulis sessilibus; ab omnibus amentis femineis longissimis, capsulis acutatis, stylo eximio producto et bipartito, foliis subtus rufescenti-sericeis.

18. S. LONGIFLORA, *Wall.* (sec. specimen in herb. Hookeri). Amentis breve pedunculatis foliis 2–3 parvis suffultis gracillimis laxe pendulis densifloris; squamis fusco-testaceis obtusis glabris vel sparse pubescentibus; capsulis sessilibus crasse ovatis acutis glaberrimis; stylo brevi; stigmatibus partitis erectis; foliis anguste lanceolatis acutis integerrimis subtus pallidioribus nonnunquam tenuiter sericeis.

Hab. in India orientali (*Wallich*); Sikkim reg. temp., alt. 9000 ped. leg. *J. D. Hooker.*

Arbuscula 10-pedalis, ramosa; ramuli breves, fere rectangulariter divaricati, glabri, cortice fusco-nigricante obducti. Gemmæ parvæ, vix lineam longæ, adpressæ; sæpius pallescentes. Folia alterna, patentia, petiolata, adulta 1½ vel 2½ pollices longa, semiunciam et plus lata, exacte lanceolata, basi et apice angustata, margine omnino integerrima, utrinque glaberrima, supra obscure viridia, costa lucida et parce pilosa percursa; subtus juniora glaucescentia, costa et nervis fuscioribus lineata, adulta opaca et dilutiora; petiolus 2 lin. longus, parce pilosus, in foliis novellis multo brevior. Amenta lateralia, patenti-pendula, adulta 2–4-pollicaria, 2 lin. crassa, valde densiflora, subflexuosa, exacte cylindrica, apice acutiuscula; pedunculus semipollicem longus, foliis 2–4 suboblongis vix pollicaribus subtus glaucescentibus vestitus. Rachis ob capsulas condensatas scrobiculata, brevius hirta; squamæ semilinea longiores, subspathulatæ, brunneo-testaceæ apice subfusciores, dorso glabriusculæ vel parce puberulæ, basin capsulæ vix attingentes; nectarium minutum; capsula ex ovata et crassa basi brevissime conica, ¾ lin. longa, fere omnino sessilis, glabra, viridi-brunnescens; stylus obsoletus apice bifidus; stigmata bipartita, laciniis divaricatis.

19. S. CAPREA, *L. Sp.* 1448. Folia tantum vidi, ad hanc speciem forsitan referenda. *Ands. l. c.* p. 476. n. 7.

20. S. JULACEA, *Ands. l. c.* p. 476. n. 8. Amentis sessilibus longissimis attenuatis squamis glabrescentibus; capsulis ovato-linearibus vix pubescentibus, pedicello nectarium ter quaterve superante, stylo nullo, stigmatibus erectis; foliis oblongis obtusiusculis subtus argenteo-pilosis; gemmis ramisque glabris.

Hab. In sylvis excelsis supra Hyderabad, alt. 2600–2730 metr. (*Jacquemont*).

Descriptionem in Act. Holm. *l. c.* vide.

21. S. WALLICHIANA, *Ands. l. c.* p. 477. n. 9. Amentis sessilibus attenuatis erectis, fem. densifloris, masc. arcuatis; squamis basi hir-

sutis; capsulis conicis elongatis cano-villosis; pedicello nectarium minutum bis superante; stylo nullo, stigmatibus erectis; foliis oblongis abrupte acuminatis glabris coriaceis; gemmis glabriusculis; ramulis pulverulis.

Salix grisea, *Wall. Catalog.* n. 3700.

Hab. In Nepalia, Kamaon, Silhet (*Wallich*), Kalimath (*Strachey et Winterbottom*), Himalaya bor.-occ., regio temp. alt. 6000–9000 ped. (*Thomson*).

Descriptionem in Act. Holm. *l. c.* vide.

22. S. HASTATA, *L.*, sp. 1443; *Ands. l. c.* p. 479. n. 10.

Specimina, quæ, a Jacquemont reportata, in herb. Parisiensi vidi, ab europæis nullo modo differunt, duabus formis ludentia: 1. *rotundifolia*: foliis rigidis, acute serratis, cortice ramorum fusco-roseo; 2. *oblongifolia*: foliis tenuioribus, fruticulus minimus. Quæ tamen in herb. Hookeriano (Tibet, reg. alp., alt. 11,000–15,000 ped.) examinavi, a nostris in eo recedunt, quod amenta multo præcociora videntur, aut omnino sessilia, aut bracteis paucis parum evolutis suffulta.

23. S. ELEGANS, *Wall. l. c.* n. 3699. Amentis pedunculatis, masc. brevibus obtusis erectis, fem. gracillimis laxe subpendulis acutis; squamis parvis pallide flavis apice glabris, nectario pedicellum capsulæ subæquante; capsula brevissime pedicellata conica glaberrima; stigmatibus sessilibus bipartitis; foliis (obovato-) lanceolatis serrulatis subtus intense glaucis demum rigidis utrinque glaberrimis.

S. Kamanensis, *Lindl. Wall. l. c.* n. 3701; S. denticulata, *Ands.*, *l. c.* p. 481. n. 12.

Hab. In India superiori alpestri in regionibus Himalensibus ad Baltal (*Jacquemont*); in Kamaon (*R. Blinkworth*); Himalaya boreal.-occid.; reg. temp. 6000–9000 ped. (*Thomson*); Niti, Garhwal, 11,500 ped. (*Strachey et Winterbottom*).

Descriptionem in Act. Holm. *l. c.* vide.

Species nitidissima alpestris, ob folia et habitum totum necnon amentorum et capsularum forma inter *S. phylicæfoliam* et *S. hastulatam* quodammodo media, posteriori autem sine ullo dubio proxima.

**S. himalensis,* Klotzsch (herb. Berolin.). Magnitudine altiori, foliis majoribus magis elongatis apicem versus attenuatis exacte lanceolatis margine acutius dentatis basi æqualiter angustatis subtus evidentius cæsiis.—*S. Govaniana,* Wall. Cat. n. 3699.

Hab. In Nepalia (*Wallich*); Sirmore (*Govan et Kamrup*); in alpibus Himalensibus (*Hofmeister*).

24. S. MYRTILLACEA, *Ands.* Amentis sessilibus crassiusculis curvatis densifloris; squamis acutatis nigricantibus basi pilosiusculis; capsulis conicis puberulis subsessilibus, stylo producto, stigmatibus indivisis; foliis rigidiusculis ellipticis integerrimis glaberrimis subtus opacis venulosis.

Hab. Sikkim, reg. alp., alt. 12,000 ped. (*J. D. Hooker*).

Frutex mediocris altitudinis. Rami sat robusti, ramosi, toruloso-angulati, cortice fusco-castaneo vel cinereo nigrescente glaberrimo nitente obducti. Folia dense conferta, petiolo glabro lutescente vix lineam longo brevissime petiolata, pollicaria, semipollicem lata, supra medium frequenter latiora, basi subrotunda vel rarius subangustata, apice acutiuscula, margine acuto subrevoluto integerrima, utrinque pure at subtus dilutius virescentia, lucida, plana, venis et præsertim costa fulvescenti subtus elevatis pulchre striata, juniora subpellucido-rufescentia, adulta membranaceo-rigida. Amenta (mascula non vidi) præcocia, omnino sessilia, nullis foliis evolutis suffulta, pollicem longa, curvata; squamæ ovatæ, acutæ, fusco-nigricantes, pilis sat longis basi obsita, capsulam basi amplectentes et eam dimidiam apice acutæ æquantes; capsulæ testaceo-fuscæ, pubescentia brevi subsericeæ, ex ovata basi conico-angustatæ, lineam longæ, stylo sat evidente rostratæ.

Habitu fruticis, forma, consistentia, nervatione, glabritie et colore foliorum *Salici myrtilloidi* omnino est similis, ut forsan ab ea vix tute distinguenda. Differt autem: amentis (quæ tamen non nisi jam deflorata vidi) certe sessilibus, foliis nullis bracteatis, capsulis brevioribus etiam sessilibus, stylo denique evidenter producto.

25. S. SCLEROPHYLLA, *Ands.* Amentis sessilibus nudis e gemmis maximis erumpentibus; stam. 2 liberis; squamis ovatis concoloribus seu apice subinfuscatis margine pilosis; capsulis sessilibus conicis rostratis sericeo-puberulis cinerascentibus, nectario ventrem capsulæ tegente, stylo obsoleto fusco, stigmatibus erectis; foliis ovalibus basi rotundatis integerrimis coriaceis planis.

Hab. Laptak Tibetiæ (*Strachey et Winterbottom*) et Dras Himalayæ, alt. 10,000–15,000 ped. (*Thomson*).

Frutex ut videtur humilis. Rami divisi et divaricati, crassiusculi, torulosi, cortice fusco sæpius glauco-irrorato obducti. Gemmæ intrafoliares ovato-conicæ, apice subincurvo productæ, intus planæ, extus trigono-teretiusculæ, basi fuscescentes sæpe irrorato-glaucæ, apice testaceo-pallidiores, petiolum sæpissime superantes; gemmæ florales sat magnæ, perulis castaneo-nitentibus diu persistentibus inclusæ. Folia juniora exacte elliptica utrinque adpressa, sericea, integerrima et glabra, subtus pallidiora, adulta pollice fere longiora, $\frac{3}{4}$ poll. lata, rotundato-ovalia, basi late rotundata immo obsolete subcordata, apice vix producta, venis arcuatis valde distinctis venulosa, pure viridia, subtus pallidiora, coriaceo-dura, plana, utrinque glabra, margine omnino integerrimo interdum subrevoluta; petiolus vix lineam longus basi in gemmæ latitudinem dilatatus. Amenta sessilia nudiuscula vel bracteis minutis suffulta, brevia (vix semipollicem longa et 2 lin. crassa), ovali-oblonga, obtusa; amenta mascula arrecta, ramo adpressa; squamæ ovato-subrotundatæ, pallidæ apice subinfuscatæ, superne tenuissime et breviter pilosiusculæ, venis obscurioribus percursæ; stamina gemina libera, filamentis glabris luteis squamam triplo superantibus, antheris rotundatis fulvescentibus. Amenta feminea horizontaliter excurvata vel recurvata; squamæ ut in amentis masculis, sed apice evidentius ciliatæ; capsulæ sessiles, ovato-conicæ, pube cinerea inferne rariori puberulæ; nectarium crassum truncatum; stylus brevis sed evidens, fuscus; stigmata brevissima, erecta, etiam fusca.

Hæc species nostræ *S. repenti* admodum similis eique sine ullo dubio proxime analoga; a qua tamen bene differt: ramis glauco-irroratis, foliis margine parum revoluto exsiccatione nullo modo nigrescentibus sed planioribus, amentis et capsulis omnino sessilibus, stylo vix producto. Ramis et gemmis magnis conicis subincurvis affinitatem cum *S. daphnoide* præbet sat magnam; folia et amenta tamen recedunt.

26. S. MYRICÆFOLIA, *Ands. l. c.* p. 483, no. 13. Amentis sessilibus brevibus crassis densifloris subbracteatis; squamis obovato-spathulatis barbatis; nectario brevissimo; capsula sessili ovato-conica albo-sericea; stylo nullo; stigmatibus erectis; foliis lingulato-oblongis integerrimis coriaceis opacis subtus pallidioribus.

Hab. In India superiori orientali (*Jacquemont et Perrottet*).

Descriptionem in Act. Holm. *l. c.* vide.

Est e tribu *S. repentis, Salici sibiricæ* etiam quodammodo similis, sed foliis opace cinerascentibus, amentis brevissimis et horizontaliter patentibus, squamis exacte spathulatis apice subtruncatis necnon capsulis sessilibus alto-tomentosis stylo producto destitutis, bene distincta. Folia nunc latiora et subovalia, nunc angustiora et plus minus lanceolata, incana vel glabrescentia variant; semper autem rigida, opaca, et subtus pallidiora.

27. S. FRUTICULOSA, *Ands.* Amentis lateralibus subsessilibus bracteis nullis aut parvis et perulis magnis suffultis ovalibus densifloris; squamis rotundato-obovatis infuscatis glabris; capsulis sessilibus ovatis subrostratis dense cinereo-villosis, nectario basin capsulæ tegente, stylo obsoleto, stigmatibus erectis; foliis anguste lanceolatis glaberrimis integris, subtus glaucis.

Hab. Pindari, Kumaon (*Strachey et Winterbottom*); Janshar, reg. alp., alt. 15,000 ped. (*Thomson*).

Fruticulus parvus fere semipedalis vel ultra; rami validi, intricati, torulosi, cortice glabro fusco-nitente vel testaceo interdum glaucescente obducti. Gemmæ sub margine conicæ castaneæ, adpressæ, obtusiusculæ. Folia vix unciam longa, 1½–3 lineas lata, basi et apice æqualiter attenuata, margine omnino integerrima, subrevoluta, supra læte viridia, subtus pallide glaucescentia. Amenta mascula pedunculo brevissimo laterali foliis minutis instructo insidentia, vix semipollicem longa, rachis hirsuta, squamæ obovato-spathulatæ, filamenta gemina libera, obscurius flava, glabra, squamam triplo superantia, antheræ sat magnæ demum fuscæ. Amenta feminea lateralia, vix pedunculata, foliis perpaucis minimis suffulta, brevissima (2 lin. longa) ovato-ovalia; rachis puberula; squamæ rotundatæ, apice subinfuscatæ ceterum flavescentes, capsulam ad mediam involventes; capsula sessilis, anguste conica dense sericea, cinerascens, nectario basin superante; stylus vix conspicuus; stigmata brevissima, erecta, nigricantia.

Est frutex parvus inter *S. hastifoliam* nostram et *S. arbusculam* forsan medius. Differt autem foliis minutis integerrimis subtus glaucis, capsulis sessilibus et stylo nullo conspicuus.

28. S. FLABELLARIS, *Ands. l. c.* p. 497, n. 24. Amentis ex apice ramorum annotinorum, fem. subdensifloris; squamis obovato-rotundatis glaberrimis; nectario basin capsulæ superante; capsula subsessili ovato-conica glaberrima; stylo mediocri, stigmatibus bipartitis; foliis obovato-rotundatis vel lingulatis glabris crenatis subtus pallide viridibus; trunco procumbente, ramis flabelliformibus.

S. lucida, Jacquemont, n. 1600. *S. obovata*, Wall., n. 3698.

S. rotundifolia, Royle, Klotzsch. herb. berol.

Hab. In humidis herbosis sub jugis versus Soogrum, alt. 4000 metr. (*Jacquemont*); and Kamaon (*Wallich*). In alpibus Himalensibus (*W. Hofmeister*); Kunawur, reg. alp., alt. 15,000 ped. (*Thomson*).

Descriptionem in Act. Holm. *l. c.* vide.

Modus crescendi omnino ut in *S. retusa*, sed consistentia foliorum fere ut in *S. hastata*, amenta iis *S. hastatæ hyperboreæ* Fr. non parum similia. Cæterum, ut facile omnes species hujus generis vere alpinæ, admodum variat.

Foliis (1) *subrotundis*, basi dilatatis, apice rotundatis.—Hæc *S. herbaceæ* non dissimilis.
(2) *obovatis*, basi eximie angustatis, apice dilatatis et sæpe emarginatis.—Hæc forma speciei est typica, modificationes maximas *retusæ* æmulans.
(3) *spathulatis*, basi sensim angustatis, apice producto, acutiusculo angustis.—Hæc formis maxime alpinis et parvis *S. hastatæ* analoga.

Amentis (1) *brevibus* crassis; in formis minimis.
(2) *longis* subrarifloris; in formis maxime elatis.

29. S. THOMSONIANA, *Ands.* Amentis in ramulis elongatis annotinis terminalibus elongatis cylindricis, masculis laxifloris, femineis subdensifloris; squamis obovato-rotundatis hirsutis; nectario producto fere ad mediam capsulam attingente; capsula subglobosa albo-villosa; stylo producto, stigmatibus crassis integris divaricatis; foliis lanceolatis subtus incano-villosis nervis albo-lineatis tenuiter et remote serrulatis.—*S. vagans*, Hook. f. (herb. Ind. orient.).

Hab. Sikkim, reg. temp., alt. 10,000 ped. (*Hooker et Thomson*).

Fruticulus subpedalis, trunco sat valido repente, ramis adscendentibus torulosis, cortice fusco nitente obductis. Folia lanceolata, utrinque attenuata, plana, margine tenuissime revoluta, remote serrulata, supra obscure viridia et glabra, subtus incano-hirta, secundum nervos arcuatos sericea. Amenta sat longa; masc. usque ad 2 pollices producta laxe patentia, flexuosa, remotiflora; squamæ atræ, densissime cinereo-hirsutæ; stamina et antheræ minutæ, fuscescentes. Amenta feminea breviora, angusta, magisque densiflora saltem parte superiore; squamæ atro-fuscæ rotundatæ capsulam mediam superantes, convexæ, pilis raris conspersæ; nectarium angustum, subcapitatum, squama parum brevius, ventrem capsulæ superans; capsula globosa, omnino sessilis, pube cinerea tomentosa; stylus rectus, semilineam longus, ater; stigmata stylo tertia parte breviora, indivisa, rectangulariter divaricata.

Habitu amentorum et forma capsularum solæ *S. reticulatæ* similis, foliis autem *S. arbusculæ* proxima.

30. S. CALYCULATA, *Hook. fil.* herb. Ind. orient. Amentis terminalibus sessilibus oblongis, masc. diandris; capsulis breviter pedicellatis ovatis glabris, stylo mediocri, stigmatibus brevibus; foliis obovatis crenulato-dentatis petiolatis subtus pallidioribus junioribus villosis, venis supra impressis.

Hab. Sikkim, reg. alpina, 14,000–15,000 ped. alt. (*J. D. Hooker*).

Fruticulus parvus, ad summum semipedalis, adscendens; truncus penna passerina crassior, cortice fusco rugoso obductus, inferiore parte radicans; rami arrecti, subfastigiati, apice ramulosi, foliati et cortice pallidiori obducti. Stipulæ nullæ conspicuæ. Gemmæ mediocres fusco-rufescentes, ovales, glabræ, adpressæ. Folia plerumque vix pollicem longa, 3–7 lin. lata, supra medium dilatata, subrotunda, ibique serraturis subdepressis, apice minoribus crenata, juniora utrinque, præsertim autem subtus et secus costam, pilis argenteis adpressis subvillosa, demum omnino glabra; supra obscure viridia, venis impressis subangulosa, subtus pallidiora non autem glaucescentia venis obscurioribus prominulis venulosa; petiolus $\frac{1}{2}$-lin. longus. Amenta mascula ovali-rotundata, foliis fulcrantibus subocculta; squamæ ligulato-obovatæ, fuscæ, glabræ, staminibus 2 triplo breviores; filamenta glabra, libera, demum subpicea, antheræ ovales exsiccatione fuscescentes. Amenta feminea etiam terminalia, sub-rotunda; squamæ ut in amentis masculis; capsulæ ex ovata basi conicæ, glaberrimæ, piceæ, pedicello nectarium glaberrimum subduplo superante.

Monstrositas in herbario adest, staminibus sc. in tubum, capsulæ apertæ instar, supra crassiorem ibique bifidum concretis, laciniis ovatis acutis intus subantheriferis, basi squama ampliata velatis.

Proxima est sine dubio speciei sequenti, sed differt: trunco multo humiliori nec flabellatim repente, ramis divaricatis nec unilateraliter erectis, foliis duplo latioribus aut integris aut obsolete crenulatis, squamis capsularum elongato-spathulatis glabris cum capsulis distinctius pedicellatis rufo-piceis.

31. S. SERPYLLUM, *Ands.* Amentis in ramulis annotinis terminalibus longius et distincte pedunculatis, masc. diandris; capsulis sessilibus glabris squamas involucrales apice superantibus, stylo elongato filiformi apice bipartito, stigmatibus bifidis laciniis brevissimis excurvis; foliis parvis ligulato-lanceolatis planis apicem versus utrinque 3-den-

tatis ceterum integerrimis breviter petiolatis subtus pallidioribus; trunco repente, ramis arrectis foliosis.—*S. longipes, Hook. fil.* (herb. Ind. orient.).

Hab. Sikkim, reg. subalp., alt. 10,000–17,000 ped. (*J. D. Hooker*).

Est fruticulus humilis, procumbens, radicanti-repens, pedalis, trunco pennam anserinam crasso, ramis simplicibus arrectis foliatis apice floriferis puberulis, 2–4 uncias longis. Stipulæ nullæ persistentes. Folia in ramulis quasi distiche condensata, circiter 3 lin. longa, supra medium linea sublatiora, lingulato-lanceolata, basin versus attenuata, apice argute denticulata, plana, glaberrima, subtus subglaucescenti-pallidiora venisque lineata, supra dense viridia costa impressa; petiolus semilineam longus, gracilis. Gemmæ, e quibus rami erumpunt, perulis luteis glabris obtectæ. Amenta terminalia, pollicaria, subclavata, densiflora, erecta. Amenta mascula: rachis aureo-pilosa; squamæ rotundato-obovatæ, intus et margine pilosæ, dorso nigricantes, staminibus triplo breviores; filamenta tenuissima, basi (ubi a squama teguntur) dense pilosa, ceterum glabra obscure fusca; antheræ minutæ oblongæ, exsiccatione flavo-virescentes. Amenta feminea primo semipollicaria et claviformia, demum cylindrica, 1½ poll. longa; rachis hirsuta; squamæ obovato-cuneatæ fuscæ, pilis crispatis cinereis ubique pilosæ, demum denudatæ, sub florescentia germina fere tota obtegentes, deinde capsulis fere duplo breviores; capsula conica, attenuato-apiculata, omnino sessilis, glabra, fusco-brunnea; nectarium basin capsulæ superans; stylus filiformis, capsula vix duplo brevior, fusco-castaneus, fere ad medium bipartitus, laciniis erectis filiformibus; stigmata brevissima, pallidiora, bifida, divaricata.

Distinctissima est species, crescendi modo (fere ut in thymo serpyllo) ramis et foliis ab omnibus diversa. Quod ad formam amentorum eorumque partium attinet proxima est *S. myrsinites*, quæ tamen abunde differt.

32. S. Lindleyana, *Wallich, l. c.* no. 13,697. Amentis in apice ramulorum annotinorum brevibus ovato-rotundatis; squamis ovatis glaberrimis capsula duplo brevioribus; capsula breviter pedicellata conica glaberrima; stylo producto, stigmatibus incrassatis; foliis ovali-lanceolatis crenulatis glaberrimis subtus pallidioribus.—*Ands. l. c.* p. 199, no. 25.

Hab. In India superiori, ad Gossain Than, ad Kumaon (*Blinkworth, sec. Wallich*), Sikkim, reg. alp., alt. 16,000 ped. (*J. D. Hooker*), et Barje Kung pass, Kumaon, 17,000 ped. alt. (*Strachey et Winterbottom,* 17).

(1) *latifolia*: foliis condensatis, 3–4 lin. longis, 1–2 lin. latis, apicem versus subserrulatis.

(2) *microphylla*: foliis valde condensatis, 2–3 lin. longis, lineam latis, costa impressa profunde canaliculatis, margine revolutis. Fruticulus habitum *Azaleæ procumbentis* non male referens.

Descriptionem in Act. Holm. *l. c.* vide.

33. S. OREOPHILA, *Hook. fil.* (*Herb. Ind. Orient.*). Amentis sessilibus foliis subobtectis minimis paucifloris; masc. diandris; capsulis subsessilibus glabris squamas lingulatas glabras triplo superantibus, stylo brevi, stigmatibus brevissimis integris; foliis oblongo-cuneatis vel obovatis apice argute dentatis ceterum integris breviter petiolatis utrinque concoloribus glaberrimis venis supra impressis.

Hab. In Sikkim, reg. alp., alt. 15,000–16,000 ped. (*J. D. Hooker*).

Fruticulus semipedalis vel minor, trunco pennam passerinam crasso ramoso atro-fusco; ramis arcuatis, ramulosis, flabellatim repentibus cum ramulis dense foliatis. Gemmæ glabræ rufescentes. Stipulæ nullæ conspicuæ. Folia $2\frac{1}{2}$–3 lin. longa, $1\frac{1}{2}$ lin. lata, obovata v. oblongo-cuneata basi angustata apice acuta ibique serraturis 3–5 profundis subfissa, ceterum omnino integerrima, venis supra impressis subtus prominentibus rugulosa, petiolo perbrevi insidentia, læte viridia, subtus vix pallidiora, utrinque glaberrima pilis paucis ad basin petioli nonnunquam hirta. Amenta in ramulis ultimis terminalia, omnino sessilia et foliis summis obtecta, 2–5 flora. Am. mascula: rachis tenuissime puberula; squama lingulata, acutiuscula, vix lineam longa, testaceo-rufescens, glabra vel pilis brevissimis et rarissimis nonnunquam conspersa venisque obscurioribus lineata; filamenta gemina libera squamam duplo superantia eique concolora, glabra; antheræ etiam pallide brunnescentes, parvæ, globosæ. Amenta feminea vix 3 lineas longa, e floribus quasi umbellatim confertis 3–7 constantia; squama spathulato-lingulata, pallide fusca, glaberrima, venulosa, basin capsulæ superans; nectarium ovatum acutiusculum ventrem capsulæ attingens; capsula basi quasi in pedicellum brevissimum constricta, deinde incrassata et itaque ex ovata basi conica, $1\frac{1}{2}$ lin. longa, obtusiuscula, castanea, lucens, glaberrima; stylus vix $\frac{1}{4}$ lin. longus tenuis; stigmata eadem longitudine excurvata, quam capsula fusciora; lana seminum nivea.

A *S. Lindleyana*, quacum habitu maxime congruit, aperte differt foliis apice profunde serratis, planis. *S. retusam serpyllifoliam* non male habitu refert.

34. S. SECTA, *Hook.* fil. Amentis terminalibus eximie paucifloris foliis conditis, masc. diandris, squamis acutiusculis glaberrimis testaceo-rufescentibus; capsulis sessilibus glaberrimis squama rotundata ad medium involutis, stylo subnullo, stigmatibus brevissimis; foliis cuneatis apice 3–5-fidis glabris; fruticulus omnium minimus.

Hab. Sikkim, alt. 17,000 ped. reg. alp. (*J. D. Hooker*).

Est quantum novi omnium *Salicum* maxime pygmæa, e trunco hypogæo ramos vix pollicares undique divaricatos valde intricatos et dense foliatos, ut folia rosulata *Androsaces* vel *Drabæ* cujusdam, cæspites densos et minimos formans. Folia vix linea longiora, apice fere eadem latitudine ibique ad tertiam partem laminæ laciniis porrectis acutis secta, utrinque viridia, subcoriacea, plana, impresse venulosa.

Amenta terminalia foliis arcte abscondita, e floribus 2–4 constantia; mascula subrariflora, squamis apice subpallidioribus integris aut subdivisis filamentis geminis liberis pallidis et glabris duplo brevioribus, antheris rotundatis sat magnis, fuscioribus; feminea ovato-ovalia e capsulis 4–6 composita, in apice ramulorum capituliformi sessilia et foliis occultata; capsulæ lineam longæ, exacte conicæ, glaberrimæ, testaceo-rufescentes, dorso squama rotundata glaberrima apice infuscata involutæ, nectario capitato glabro ventrem capsulæ superante; stylus vix conspicuus; stigmata minima, divaricata.

S. oreophila et *S. secta* inter se eodem modo affines sunt ut *S. Brayi* et *S. berberifolia*; bene autem distinguuntur non tantum habitu toto fruticuli sed etiam foliis et amentis.

On Leopoldinia Piassaba, *Wallace*. By Richard Spruce, Esq. Communicated by George Bentham, Esq., V.P.L.S.

[Read June 16th, 1859.]

As the palm producing the Piassaba of the Rio Negro—better known as that of Pará, from which port it is exported in vast quantities to Europe and N. America—has been supposed, for want of sufficient data, identical with the *Attalea funifera* of Martius, which furnishes the Piassaba of Bahia, I am desirous of laying before the Linnean Society a description of the former, which has been correctly referred by Mr. Wallace to the genus *Leopoldinia*. In proof of this assertion, I need cite only the most prominent characters: thus, in *L. Piassaba* Wallace, *the male flowers have six monadelphous stamens, and the fruit is a berry with a sarcocarp composed of thick interlacing fibres*, as in the *Leopoldiniæ* described by Martius; whereas in the genus *Attalea*, *the male flowers have from ten to twenty-four free stamens; and the fruit is a drupe, with a stony putamen*. The fruits of the Piassaba have the peculiar dull blood-colour, the compresso-globose form (though less compressed than in *L. minor*), and the gibbosity at the base (like that of the fruits of some *Sapindi*) which characterize all the species of *Leopoldinia* known to me*. The long beard of the petioles, extending to the very ground, except in the tallest specimens, where the lower part decays and falls away, and the crown of long widely-arched fronds, with the lower part of the rachis destitute of pinnæ for a length of nearly 5 feet, give to the Piassaba an aspect *sui generis*, and render it one of the most striking and handsome of the noble family of palms. This beard is the membrane which envelopes the frond in its folded-up state, and which in most palms falls away entirely when the frond expands, or remains attached in fragments to the margin and apex of the pinnæ. The other species of *Leopoldinia* have the stem "fibrillitio reticulato circumtextus"—sheathed with the persistent petiole-bases, which do not terminate in a pendulous beard, as in *L. Piassaba*. In tall specimens this net-work falls away, especially in *L. major*, Wallace*.

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* The fruits of the *Leopoldinia* are called "flavo-virentes" by Martius, who, it is plain, had not seen them fully ripe.

It is plain in all *Leopoldiniæ* that the sarcocarp of the fruit corresponds to the sheathing base of the petiole, as it consists of the same interlacing woody or horny fibres, only on a smaller scale and more compact. The sarcocarp of *L. Piassaba* differs from that of the other species of *Leopoldinia* in having several inner layers of slender brown interlaced fibres, which correspond to the beard of the petiole.

As Martius had not seen his *Leopoldiniæ* in all stages of their growth, the delicate fugacious spathes escaped his notice, and he describes the genus as spatheless, which would be an anomaly among palms. In reality, all the species have two very thin fusiform brown spathes, which fall away at an early stage, long before the flowers are fully formed. I have good specimens of those of *L. minor*, Mart.

The ascertained distribution of the Piassaba palm is from the river Padauirí (a large tributary of the Rio Negro, entering on the left bank) on the south, to the cataracts of the Orinoco on the north; and from near the Japurá on the west, to the sources of the Pacimoni on the east. Its place of growth is in low sandy flats, where the water stands to a slight depth in rainy weather, but it avoids the swamps and the gapós in which the Mauritias and Euterpes delight. It is mostly found far away from the banks of the rivers; and I have seen but a single plant in such a locality, namely, just within the lower mouth of the Casiquiare, on the right bank, on a barranca beyond the reach of floods. This was a noble specimen—perhaps over 40 feet high. My friend Wallace had been wrongly informed of the partiality of the Piassaba for black waters, as it grows more abundantly than anywhere else in the forests of the Casiquiare, and especially from the mouth of Lake Vasiva upwards, where the waters of the river are much whiter than below; but, as I have nowhere seen it on ground inundated by the rivers, it is plain that the colour of their waters cannot influence its existence. Near two Indian villages on this part of the Casiquiare, where I penetrated deep into the forest, I came on large groves of Piassaba. Nothing that I have seen in Amazonian forests dwells more strongly and pleasantly on my memory than my walk among these strange bearded columns, from whose apex sprang the green interlacing arches which shaded me overhead. The ground was dry—herbaceous vegetation there was none—and almost the only companions of the palm were scattered low trees of *Heterostemon simplicifolium* Spruce, with its large blue butterfly-like flowers, and another sort of tree of equally humble growth, clad with numerous flesh-coloured flowers, which Mr. Bentham is disposed to consider a new genus of *Flacourtiaceæ*. To have escaped from the cloud of mosquitos on the bank of the river no doubt enhanced the enjoyment. This was on the south side of the Casiquiare, but the Piassaba is equally abundant north of that river, and throughout the broad plain included by the Casiquiare, Orinoco, and Guainia. North of the Orinoco, on the Cunucunúma, Ventuári, and Sipápo, it is apparently much scarcer.

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* *L. major* is a many-stemmed palm—I have counted as many as twenty-four stems from one root; and by this character alone it may be distinguished from the other species of the genus, all of which have solitary stems. Seedling plants often form wide strips on the edge of sandy islands of the Rio Negro. In this state I have mistaken them, at a distance, for a species of *Pariana*—a genus of grasses well known to have considerable affinity to the palms.

Of the Piassaba collected on the Casiquiare and Guainia, about half is taken down to Pará, and the other half to Angostura, on the Orinoco. In the summer season the Indian villages on those rivers present a very lively appearance, from the boat-building and rope-making which occupy their inhabitants. An interesting circumstance respecting the latter branch of industry came to my knowledge at San Carlos del Rio Negro, where, constantly hearing an old Indian woman spoken of as 'La Inglesa,' I sought her out, and found that she had been the lawful wife of an Englishman—a soldier in the Royalist army, who, when the Republican party triumphed, retired towards the frontier of Brazil, and squatted down at San Carlos. I was assured by his widow, and by others of the inhabitants, that this man, whom they knew only by the name of 'Don Juan,' first taught the people to make Piassaba-rope by the aid of a wheel, and in fact established the first rope-walk in the Canton del Rio Negro. Whether this were true, or whether the Portuguese at an earlier date extended this branch of industry beyond the limits of their own territory, it is certain that, in so much as I have yet seen of the Peruvian and Quitenian Andes, rope of every kind, whether of Agave, Yucca, or palm fibre, or of cotton, is made purely by hand.

To Mr. Wallace's interesting account of the mode of collecting the Piassaba-fibre I have nothing to add, save that, as in the young plants, from which it is solely obtained, the beard is not always completely separated into fibres, but hangs down in riband-like strips, it is necessary before cutting it off to comb it out by means of a rude comb of two or three pointed sticks or long palm-prickles.

Besides the use which is made of the beard of the Piassaba, the pulpy envelope of the sarcocarp in the ripe fruit is said to yield the most delicious of all palm drinks, bearing great resemblance to cream both in colour and taste. I have not had the good fortune to taste it, or even to see the ripe fruit, which comes into season at midsummer, but, like the fruit of most other trees, is subject to seasons or periods of intermittence, when little or no fruit is matured. In 1853, the fruits all fell off when green. In the summer of 1854, I was prostrated by remittent fever at San Fernando de Atabapo. In the month of October of the same year I made an excursion of three days from San Carlos into the forest at the back of Solano, on the Casiquiare, with the express object of gathering flowers of the Piassaba, for which I was exactly in the season; but, singularly enough, on four trees I caused to be cut down there were only male flowers; and the heavy rain, with the sloppy state of the forest, compelled me to desist from further search. In the following November, a few days previous to my final departure from Venezuela, I visited another locality for the palm, on the Guainia, where I collected the fruit, which was almost fully formed externally, though the nucleus was still in a liquid state. In this place nearly all the Piassabas seen were monoicous. It seems, therefore, that the fruit takes from October to June (both inclusive), or nine months, to ripen. Some palms require a whole year, so that I have not seldom gathered ripe fruit and flowers on the same tree.

The other species of Leopoldinia have a thickish fleshy rind to the fruit, but it is so bitter as not to be eatable.

Another bearded palm is known to me, which has a considerable range of distribution in latitude, and apparently a very limited one in longitude, extending all along the eastern roots of the Andes, from a good way up the Huallaga, on the south, to the sources of the Bombonasa, and how much further northward I know not; but I have myself seen it through nearly six degrees of latitude. It is particularly abundant on low alluvial ridges strewed with pebbles of auriferous quartz near Paca-yacu, on the Bombonasa, and near Chapaja, on the Huallaga; but it nowhere descends into the Amazonian plain, nor have I seen it higher among the hills than about 2000 feet. This palm is a true *Attalea*, which I suppose distinct from *A. funifera* Mart., because the fruit is of a different form, and because Martius assigns a submaritime habitat to his palm. It is known to the inhabitants of Maynas by the name of '*Biróti-huási*' (*Biróti*, the darts used in shooting with the blowing-cane, and *huási*, a habitation), because they make their Biroti of strips of the petiole. The beard is deciduous —not persistent, as in the Piassaba—shorter, far less copious, and apparently less durable. It makes, however, excellent brooms, which is the only use I have seen it turned to. In the Quitenian Andes a very similar broom is made of the base of the petiole of the Cádi palm (*Phytelephas macrocarpa*); but the decayed parenchyma requires to be combed away from the fibres ere they can be well put to this use.

I proceed to give the dimensions of a Piassaba palm which I cut down in the forests of the Guainia, in November 1854; followed by a detailed description of the same species, drawn up from fresh specimens.

Caudex, 40 ft. Fronds, 15½–16½ ft. (including petiole of 4 ft. 8 inches). Pinnæ, 63 pairs. Beard, 21 inches long (but on young plants growing close by as much as 4 feet 9 inches long). Spadix, 4 ft.; stipes (to first branch), 15 inches, 10 lines broad, 4½ lines thick; remains of two spathes, 5 inches apart. Fruit (not ripe), 21 lines long, 18 lines broad, 15 lines thick.

LEOPOLDINIA PIASSABA, *Wallace, Palm Trees of the Amazon*, p. 17.

Piaçaba Brasiliensium. *Chiquichiqui** Orinocensium.

Hab. Per tractus sylvarum Amazoniensium a fluvio Padauirí ad Orinoci

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* The name 'Chiquichiqui' originated on the Orinoco; but I am ignorant to what Indian language it belongs.

cataractas usque, in arenosis depressis quibus tempore pluvioso aquæ imbrium colliguntur, gregarie viget.

Descr. *Caudex* solitarius, mediocris (15–40-pedalis), crassitudine eum *Iriartæ exorrhizæ* æquans, lævis, annulatus, barba petiolorum persistente omnino velatus, vel in stirpibus elatioribus, barba marcida delapsa, apice solo barbatus.

Frondes terminales, plurimæ contemporales, lato-arcuatæ, infimæ subpendulæ, pinnatæ. *Petiolus* elongatus, basi erectus concavo-convexus, margine in vaginam fibroso-reticulatam badiam demum in barbam pendulam dissolutam dilatatus, superne semiteres angulis acutis. *Pinnæ* sub 60-jugæ, horizontaliter patulæ apice subpendulæ, lineares acuminatæ.

Spadices 2 v. 3 contemporales monoici dioicive, arcuato-penduli, paniculati, 4-ies divisi, ambitu triangulari-acuminati, tomento pallido fulvo haud dense vestiti. *Stipes* a basi ad ramum infimum usque valde compressus et reliquiis spatharum duarum truncato-laceris instructus, superne polygonus. *Rami* angulares, basi plano-convexi, angulo recto v. subdivergente inserti; primarii sub 25, alterni, tres inferiores distichi prælongi 3-pinnati, superiores subito breviores polystichi; ramuli haud profunde foveolati, floriferi. *Bracteæ* minutæ, ad ramorum basin triangulares acuminatæ, ad ramulorum basin subulatæ acuminatæ.

Flores ♂ ochrei, odore *Resedæ odoratæ* scatentes, vel ad spadicem totum ejusdem diversæve stirpis, vel ad spadicis ramos superiores solos, ramis infimis flores ♀ gerentibus. *Calyx* uterque 3-sepalus; *sepala exteriora* oblata fimbriata tenuiuscula pellucida late imbricata; *interiora* duplo longiora late ovata obtusa cartilaginea valvata. *Stamina* 6, filamentis basi ipsa coalitis et ovarii rudimento stylos 3 rudimentarios gerenti adnatis.—*Flores* ♀ haud vidi.

Bacca drupæformis subcompresso-globosa, basi subgibba, monosperma. *Epicarpium* sordide sanguineum nitidum. *Sarcocarpium* crassum laminis plurimis constans; lamina exteriore e fibris crassis corneolignescentibus intertextis anastomosantibusque; laminis interioribus e fibris tenuibus intertextis. *Testa* tenuis membranacea badia separabilis. *Nucleus* in fructu juniori nondum formatus est.

Descriptions of some new species of *Musci* from New Zealand and other parts of the Southern Hemisphere, together with an enumeration of the species collected in Tasmania by William Archer, Esq.; arranged upon the plan proposed in the 'Musci Indiæ Orientalis.' By WILLIAM MITTEN, Esq., A.L.S.

[Read March 17th, 1859.]

I. ANDREÆACEÆ.

1. ANDREÆA, *Ehrh.*

A. subulata, *Harvey*.

Hab. Tasmania; Jackey's Plain Creek, on rocks; rivulet at the back of Cumming's Head, Western Mountains. *Mr. Archer.*

A. nitida, *Hook. fil. et Wils.*

Hab. Tasmania; on stones; rivulet near Cumming's Head, Western Mountains. *Mr. Archer.*

A. petrophila, *Ehrh.*

Hab. Tasmania; the Falls. *Mr. Archer.*

A. ACUMINATA (*Mitten*). *A. acutifoliæ* simillima, foliis e basi erecta caulem amplectente patulis apicibus incurvis explanatis ovato-lanceolatis margine partis erectæ minute crenulata dorso apicem versus inconspicue papillosis, cellulis ex apice ad medium minutis quadrato-rotundatis diametro circiter $\frac{1}{4000}$ unciæ metientibus deinde in oblongas subparallelogrammaticas parietes latitudine superantes inferne in longiores angustas fuscidulas parietibus crassioribus transeuntibus, perichætialibus ovalibus tenuiter acuminatis convolutis.

Hab. Tasmania; Cheshunt. *Mr. Archer.*

Very nearly allied to *A. acutifolia*, but with leaves a little wider, and cells in the upper portion smaller and more numerous, all with much narrower walls; those just below the middle of the leaf with walls narrower than their own width, and pellucid. From *A. petrophila* it recedes in the form of its leaves as well as in their cellular structure already described.

A. MONTANA (*Mitten*). *A. alpinæ* simillima, foliis parte superiore sensim acutis vix acuminatis margine integerrimis, margine partis inferioris minute crenulato, cellulis basi oblongis elongatisque parallelogrammaticis cito in minutas longitudine $\frac{1}{2000}$, latitudine $\frac{1}{4000}$ unciæ metientes transeuntibus.

Hab. On rocks; rivulet behind Cumming's Head, Western Mountains; Tasmania. *Mr. Archer.*

Closely resembling *A. alpina* in size, habit, colour of its leaves, and general appearance; but the outline of its leaves, when compressed, is ovate, slightly acuminate; the cells at the base distinctly parallelogrammatic, and those of the upper portion larger. *A. acutifolia* has much narrower leaves.

A. ASPERULA (*Mitten*). Gracillima, cæspitosa, ramosa, foliis patentibus ovato-lanceolatis acutis enerviis margine superiore dorsoque papillis asperrimis, cellulis superioribus longitudine $\frac{1}{3000}$ latitudine $\frac{1}{5000}$ unciæ metientibus, inferioribus in folii medio croceis oblongis paululum majoribus.

Hab. Australian Alps, *D. F. Müller*, No. 14, *ex parte*. Readily distinguished from all the allied species by the very papillose margin and back of its leaves.

II. DICRANACEÆ.

1. PLEURIDIUM, *Brid.*

P. GRACILENTUM (*Mitten*). Monoicum, habitu *P. alternifolii*, gracile, foliis inferioribus e basi ovali subulato-lanceolato-acuminatis, nervo subulam superiorem totam occupante, margine ad basin partis subulatæ indistincte crenulato vel lævi, cellulis inferioribus oblongis parallelogrammaticis superioribus minoribus, perichætialibus thecam non tegentibus patulis anguste ellipticis subulato longe attenuatis canaliculatis apice parce denticulatis integerrimisve laxe areolatis, theca in pedunculo brevi subglobosa leptodermi, operculo brevissimo, calyptra cucullata ad thecæ mediam descendente.

Hab. West side of Tower Hill, Tasmania; *Mr. Archer*. Also in King George's Sound, New Holland, *Menzies*.

Excepting that the perichætial leaves are less straight and bristly, in general appearance scarcely different from *P. alternifolium*, but its leaves are of a different form.

P. TENELLUM (*Mitten*). Monoicum, habitu staturaque *P. nitidi*, flore masculo gemmiformi minuto in foliorum caulinorum axillis, cellulis foliorum paululum brevioribus firmioribusque.

Hab. Tasmania, Cheshunt, *Mr. Archer*.

When dry, firmer than *P. nitidum*, with which it corresponds very closely, excepting in the male inflorescence, which has been observed on a single individual only. The substance of the leaves is firmer, and the whole plant pale brown. It appears to be distinct, but requires further examination in living specimens.

2. BRUCHIA, *Schw.*

(*Sporledera*, Hampe.)

B. MINUTA (*Mitten*). Monoica, perpusilla, brevicaulis, foliis patentibus lanceolatis angustatis, nervo percurrente, margine superne serrulato, cellulis laxiusculis, theca suborbiculari-ovata acuta collo sensim attenuato sessili erecta, calyptra apice rugulosa thecæ tertiam partem obtegente, flore masculo gemmiformi.

Hab. Tasmania, sides of ditches, Cheshunt, *Mr. Archer*.

Plants very minute, brownish, considerably smaller than *B. brevipes*. Leaves, when dry, appressed. In appearance, it resembles the smallest states of *Pleuridium nitidum*.

3. Leptotrichum, *Hampe*.

L. præaltum (*Mitten*). Dioicum, dense cæspitosum, robustum, caule elato subsimplici radiculis fuscis albidisve tomentoso, foliis patulis siccitate incurvis recurvisve subcrispatis e basi ovali sensim ad apicem angustatis lanceolatis concavis nervo lato sed tenui partem lanceolatam fere totam occupante, margine superne minute subserrulato, cellulis inferioribus oblongis ovoideis in rotundatas transeuntibus alaribus nullis, perichætialibus convolutis vaginatisque externis acuminatis internis subito in acumen setaceum contractis, theca in pedunculo elongato flavo cylindrica erecta, operculo subulato æquilongo subrecto, peristomio parvo dentibus rubris dimidio superiore irregulari modo bi- trifidis annulo angusto, flore masculo parvo in caule gracillimo innovante e tomento in axillis foliorum plantæ fertilis oriente.
Hab. Magellan, in woods, Sandy Point, *Lechler*, 1022.

In size and appearance not unlike *Dicranum Drummondii*, B. & S., but in the structure of its leaves closely allied to those species of *Leptotrichum* in which the nerve occupies nearly the whole of the upper portion of the leaf.

L. australe (*Mitten*). Monoicum! caule elongato ramoso cæspitoso, foliis erecto-patentibus elongato-ovalibus ellipticisve, cellulis elongatis areolatis, nervo in subulam setaceam apice parce denticulatam longe excurrente, perichætialibus elongatis convolutis apice abruptis nervo longo capillari excurrente, theca in pedunculo circiter semiunciali pallide fusco ovali erecta fusca, flore masculo in ramo ex inferiori parte caulis fertili egrediente terminali.—*Lophiodon strictus*, Hook. fil. et Wils. in Fl. Antarct. Crypt. p. 18. t. lix. f. 2. *Didymodon longifolius*, *var.* 3. *penicillatus*, eorund. *l. c.* p. 102. *D. longifolius* et *Distichium capillaceum* in Flora Novæ Zelandiæ enumerati etiam huic speciei pertinent.
Hab. Cheshunt, Tasmania, *Mr. Archer*; New Zealand, *Dr. Lyall*; Falkland, Lord Auckland's and Campbell's Islands, *Dr. J. D. Hooker*.

This most distinct moss has been wrongly described with dioicous inflorescence and striated leaves. In the specimens collected by Mr. Archer the stems are four inches high, but the seta is not longer than in the shorter states of the plant. The capsules in all the specimens are too old to afford an idea of the perfect peristome; but in every other particular the structure is similar to that observable in the species of *Leptotrichum*, and not at all different from that of *Weissia stricta*, Hook. fil. et Wils. Flora Antarct. Crypt. p. 98, t. clii. f. 4, which is also referable to the same genus.

L. HYALINUM (*Mitten*). Dioicum? caule elongato ramoso, foliis erecto-patentibus e basi elongata elliptica convoluta hyalino-marginata subulato-angustatis, nervo subulam superiorem totam occupante apice parce denticulato, cellulis inferioribus elongatis subparallelogrammaticis sensim superne in minutas rotundatas transeuntibus firmis, perichætialibus basi latiore longioreque vaginantibus, theca in pedunculo luteo-fusco ovali-cylindracea.

Didymodon longifolius, var. 2. *tenuifolius,* Hook. fil. et Wils. Crypt. Antarct. p. 102.

Hab. On the ground on the hills, Hermite Island, Cape Horn, and in the Falkland Islands, *Dr. J. D. Hooker.*

In habit similar to *L. Hookeri,* C. Müll., but in the outline of its leaves more like *L. australe*; readily distinguished from both by the hyaline margins of its leaves. The male flower has not been seen.

L. OLDFIELDII (*Mitten*). Monoicum, habitu *L. affinis,* foliis e basi lata oblongo-ovata erecta longe subulatis patentibus apice parcissime denticulatis, cellulis angustis elongatis sensim superne brevioribus firmis nervo subulam superiorem totam occupante canaliculatis, perichætialibus basi longiore latioreque elliptica convolutis, theca in pedunculo elongato ætate rubro cylindracea arcuata, flore masculo gemmiformi brevifolioso in foliorum caulinorum axillis.

Hab. In Tasmania, *Mr. Oldfield,* No. 154.

Very near to *L. affine,* C. Müll., in size and appearance, but with leaves about twice as wide at the oblong base, and thence subulate.

L. capillaceum (Distichium, *B. & S.*).

Hab. Tasmania, behind Cumming's Head, Western Mountains, with *Conostomum pusillum, Mr. Archer.*

L. FERRUGINEUM (*Mitten*). Dioicum, caulibus cæspitosis, radiculis ferrugineis dense intertextis, foliis e basi erecta ovali-oblonga sensim attenuatis patentibus integerrimis nervo percurrente cellulis basi utrinque ad margines pluribus oblongis quadratisque parallelogrammaticis superioribus inæqualibus perichætialibus conformibus, theca in pedunculo rubro erecta globoso-ovata, operculo conico rostrato, peristomio e dentibus latis rubris dicranoideis annulo latiusculo composito.

Hab. On the ground, plain behind Cumming's Head, Western Mountains, Tasmania, *Mr. Archer.*

Whole plant dull ferruginous-green. Stems from half an inch to one inch in height. In general appearance it has some resemblance to *L. Jamesoni* (*Dicranum*), Taylor; but it is smaller, compactly cæspitose, and interwoven with intensely ferruginous radicles. The seta is about three lines long, rather stout, pale red. The small subglobose erect capsule readily distinguishes it from all its allies.

4. TREMATODON, *Rich.*

T. FLEXIPES (*Mitten*). Dioicus? cæspitosus, caule erecto breviusculo, foliis erecto-patentibus lanceolato-subulatis integerrimis nervo lato totam fere folii partem superiorem occupante, perichætialibus latis vaginantibus, theca in pedunculo brevi gracili flexuoso stramineo suberecta rufo-fusca collo pallidiori æquilongo, operculo curvirostrato, peristomio e dentibus rubris dicranoideis annulo composito.

Hab. On the ground, plain behind Cumming's Head, Western Mountains, Tasmania, *Mr. Archer.*

Very nearly resembling *T. brevicollis*, but with leaves in which the nerve occupies the whole of the upper three-fourths, the seta flexuose, and the peristome with distinctly cleft teeth.

5. BLINDIA, *Br. & Sch.*

B. acuta, *B. & S.*, var. *curviseta.*

Hab. Tasmania, on stones, rivulet behind Cumming's Head, Western Mountains, *Mr. Archer.*

6. DICRANUM, *Hedw.*

* *Eudicranum.*

D. robustum, *Hook. fil. et Wils.*

Hab. Tasmania, Cheshunt, *Mr. Archer.*

D. pungens, *Hook. fil. et Wils.*

Hab. Tasmania, Cheshunt, *Mr. Archer.*

D. Billardieri, *Schw.*

Hab. Tasmania, on logs in creeks, *Mr. Archer.*

D. dicarpon, *Nees.*—D. leucolomoides, *C. Müll. in Bot. Zeit.* 1851, p. 549.

Hab. Tasmania, in many places, *Mr. Archer*; Wellington Falls, Mount Wellington, *Mossman*, No. 744.

Variable in appearance, but a most distinct species.

D. Menziesii, *Taylor.*—D. brachypelma, *C. Müll. in Bot. Zeit.* 1851, p. 550!

Hab. Tasmania, in creeks, *Mr. Archer.*

D. ANGUSTINERVE (*Mitten*). Dioicum, *D. Billardieri* simile, caulibus brevibus ramosis, foliis patentibus subsecundis e basi subovali elongata sensim angustatis, nervo angusto percurrente dorso marginibusque apicem versus serrulatis, cellulis elongatis angustis alaribus oblongis quadratisque flavide fuscis in massam quadratam utrinque dispositis, perichætialibus convolutis internis vaginantibus subito in acumen

breve setiforme angustatis, theca in pedunculo breviusculo semiunciali arcuata inclinata basi strumosa, peristomio dentibus rubris dicranis.

Hab. Tasmania, on dead wood, *Mr. Archer* and others.

Nearly allied to *D. Billardieri,* but with somewhat the aspect of *D. reflexum.* It differs from *D. Billardieri* in the form of the wider portion of its leaves being more elongate, and the narrow upper part being shorter; the internal perichætial leaves are also furnished with a bristle-like point, which seems wanting in *D. Billardieri.*

** *Campylopus.*

D. introflexum, *Hedw.*

Hab. Tasmania, on logs, and on the ground, Cheshunt, *Mr. Archer.*

D. TORQUATUM (*Mitten*). *D. pyriformi* omnibus partibus maxime simile sed foliis a parte inferiori magis gradatim subulatis et lamina altiore a nervo distinguenda, cellulis in parte laminæ superiori quadruplo minoribus, foliis perichætialibus internis basi tenerioribus, pedunculo siccitate spiraliter torto.—*Campylopus pallidus,* ex parte Hook. fil. et Wils. Fl. New Zealand, xi. p. 68, t. 84. f. 3. *Dicranum flexuosum,* C. Müll. in adnot. ad Muscos Mossmanianos, Bot. Zeit. 1851, p. 551. *D.* (*Campylopus*) *torfaceum,* Mitten in Hook. Kew. Miscell. 1856, p. 257.

Hab. New Zealand, *Colenso, Sinclair, Mossman*; Tasmania, on decayed bogs, West-end Rivulet, Cheshunt, *Mr. Archer*; Victoria, Australia, *D. F. Müller.*

So very much does this species resemble *D. pyriforme* (Campylopus, *Schultz*), that it may readily be passed over as a state of that species, having the same soft appearance. The species referred to in the 'Flora of New Zealand' as the typical form gathered by Prof. Jameson in the Andes of Quito is a more robust species, with stiffer and less finely attenuated leaves, and a capsule rough at the base. *Dicranum nodosum,* Beauvais in Hb. Hooker, is a much larger moss, with leaves having a longer base, stouter nerve, and stiffer habit; it is in all probability synonymous with *Campylopus nivalis,* Brid. If *Campylopus* could be defined so as to distinguish it from *Dicranum,* there would be no necessity to alter the name of the present species; but it seems impossible to separate them in an extensive herbarium, notwithstanding the difference in the aspect of some of the species, and, there being a *Dicranum pallidum* from N. America previously published by Bruch and Schimper, an alteration has become unavoidable.

7. DIDYMODON, *Hedw.*

D. purpureus, *Hedw.* (Ceratodon, *Brid.*).

Hab. Tasmania, on rocks and stones, Western Mountains, *Mr. Archer.*

D. Tasmanicus (Tridontium, *Hook. fil.*).
Hab. Tasmania, fossiliferous limestone, Meander River, *Mr. Archer.*

D. papillatus, *Hook. fil. et Wils.*
Hab. Tasmania, the Hummocks, *Mr. Archer.*

D. cyathicarpus (Zygodon, *Mont.*).
Hab. Tasmania, Cheshunt, *Mr. Archer.*

This and the allied European species, *D. Lapponicus* and *D. Mougeotii,* referred to *Zygodon,* and more recently, by M. Schimper, proposed as distinct, under the name of *Amphidium,* scarcely differ from *Rhabdoweissia,* except in the absence of a peristome; and *Rhabdoweissia* itself is not generically separable from *Didymodon.*

8. HOLOMITRIUM, *Brid.*

H. cirrhatum (Weissia, *Hedw.*).
Hab. Tasmania, Cheshunt, *Mr. Archer.*

Like those specimens collected in Victoria, Australia, by Dr. F. Müller, but, except in being rather more slender, not different from European specimens.

III. LEUCOBRYACEÆ.

1. LEUCOBRYUM, *Hampe.*

L. candidum, *Dill.*
Hab. Tasmania, Cheshunt, *Mr. Archer.*

IV. TRICHOSTOMACEÆ.

1. ASTOMUM, *Hampe.*

A. cylindricum (Phascum, *Taylor*).
Hab. Tasmania, Cheshunt, *Mr. Archer.*

2. WEISSIA, *Hedw.*

W. controversa, *Hedw.*
Hab. Tasmania, Port Sorrell, Long Hill, and Cheshunt, *Mr. Archer.*

3. TORTULA, *Hedw.*

T. Australasiæ, *Hook. et Grev.*
Hab. Tasmania, west side of Cataract, Launceston, *Mr. Archer.*

T. torquata, *Taylor.*
Hab. Tasmania, Doublegate Park, *Mr. Archer.*

T. calycina, *Schw.*
Hab. Tasmania, Port Lovell, *Mr. Archer.*

T. KNIGHTII (*Mitten*). Monoica, habitu statura coloreque *T. Northianæ* simillima, foliis siccitate crispatis humidis patentibus e basi paululum latiore subovata lanceolatis apice acuminatis comalibus sensim ad apicem angustatis lanceolatis marginibus undulatis integerrimis nervo concolori excurrente mucronatis, cellulis basi hyalinis elongatis utrinque ad margines altius quam in medio adscendentibus subito in minutas viridas obscuras transeuntibus, perichætialibus longioribus paululo latioribus, theca in pedunculo rubro cylindrica, operculo subulato theca dimidio breviore, peristomio et flore masculo *T. Northianæ*.
Hab. New Zealand, *Colenso, Kerr, Knight*.

This is the *T. cæspitosa var.* of Hook. fil. et Wils. in Fl. New Zealand; but it is assuredly distinct from *T. Northiana*, Grev., in the much narrower leaves with undulated margins.

4. ACAULON, *Hampe*.

A. APICULATUM, *Hook. fil. et Wils. Fl. Nov. Zeland.* par. ii. p. 58, t. 83. f. 1, ubi calyptra sub fig. 5 delineata delenda est et capsulæ apiculus in figuris 3 et 4 calyptram veram repræsentat.
Var. turgidum foliis internis turgide concavis longioribus.
Hab. Tasmania, Cheshunt, *Mr. Archer*.

These specimens are so different at first sight from those from New Zealand, from the turgid, inflated state of the perichætial leaves, that, relying on the figure, they were considered distinct; but an examination of authentic specimens shows that the species has not been fairly illustrated. The capsule is globose, without any apiculus; and the apiculus observable in the figures above quoted represents, much too large, the minute calyptra. The calyptra figured more nearly represents one of the lower leaves than any other portion of the moss. The margins of the leaves are generally obtusely crenate at the apex.

5. DESMATODON, *Brid.*

D. nervosus, *Brid.*
Hab. Tasmania, Cheshunt, *Mr. Archer*.

6. SYNTRICHIA, *Brid.*

S. princeps (Tortula, *De Not.*; Barbula Mülleri, *B. & S.*).
Hab. Tasmania, on rocks and stones, the Hummocks, near Cleveland, and on rocks, Port Sorrell, *Mr. Archer*.

Divided by Mr. Wilson (*Fl. Tasmanica ined.*) into three species, distinguished from each other by the outline of the leaves; but the structure is the same in all, and the differences appear of the same importance as those observable in forms of *S. ruralis* and *S. lævipila*.

S. FUEGIANA (*Mitten*). Dioica, *S. principi* simillima sed minor, foliis erecto-patentibus siccitate appressis ambitu ovato-lingulatis apice obtusis nervo in pilum hyalinum flexuosum lævem excurrente, margine plus minus recurvo integerrimo, cellulis superne minutissimis rotundatis obscuris e medio ad basin pallidioribus elongatis pellucidis, perichætialibus latioribus, theca in pedunculo elongato rubro cylindrica curvata, operculo subulato, peristomio elongato dimidio inferiore tubuloso.

Hab. Falkland Islands, on sand-hills in Uranie Bay, *Dr. J. D. Hooker*; Capo Negro, Magellan, *Lechler*, 1088.

Rusty-green; nearly allied to *S. princeps* and to *S. ruralis*, but smaller; stems half an inch to one inch high, seta an inch long. Easily recognized by its ovate leaves.

7. STREPTOPOGON, *Wils.*

S. mnioides, *Mitten* (Barbula, *Schw.*).

Hab. Tasmania, on logs in copses, Falls-run, *Mr. Archer*; Chili, *Lechler*, 654.

The calyptra of this species resembles that of *S. erythrodonta*, to which it is very closely allied.

Another species of this genus is *S. marginatus* (Schistidium, *Hook. fil. et Wils. Crypt. Antarct.* t. 151. f. 6).

8. ENCALYPTA, *Schreb.*

E. AUSTRALIS (*Mitten*). Monoica, *E. vulgari* simillima, foliis inferioribus ligularibus comalibus sub-elliptico-spathulatis obtusiusculis nervo percurrente dorso apice parce denticulato scabrove margine ob papillarum prominentiam erosula, theca cylindrica lævi gymnostoma, operculo subulato sub-æquilongo, calyptra apice lævi.

Hab. Tasmania, near the Cataract, Launceston, and on the fossiliferous limestone near Cheshunt, *Mr. Archer*; New Zealand, *Colenso, Kerr, Knight.*

Differs from *E. vulgaris* in the less rounded apices of its leaves and smooth point of the calyptra.

V. GRIMMIACEÆ.

1. GRIMMIA, *Ehrh.*

* *Schistidium.*

G. apocarpa, *Hedw.*

Hab. Tasmania, on the rocks, the Falls; on stones, the Hummocks; on rocks, Meander River, and Jackey's Plain Creek, *Mr. Archer.*

** *Eugrimmia.*

G. pulvinata, *Hook. et Tayl.*

Hab. Tasmania, Cheshunt, and *var. β. Africana*, on rocks, Port Sorrell, and elsewhere, *Mr. Archer.*

G. trichophylla, *Grev.*
Hab. Tasmania, Cheshunt, *Mr. Archer.*

G. leucophea, *Grev.*
Hab. Tasmania, on stones, the Hummocks, *Mr. Archer.*

*** *Rhacomitrium.*

G. Symphyodonta, *C. Müller, Synops.* i. p. 809.—G. emersa, *ejusd., Bot. Zeit.* 1851, p. 562.
Hab. Tasmania, on rocks, 'The Falls,' *Mr. Archer*; Mount Wellington. *Mossman,* No. 743; elsewhere, *Mr. Oldfield.*

G. crispula (Rhacomitrium, *Hook. fil. et Wils. Crypt. Antarct.*).
Hab. Tasmania, on rocks and stones, rivulet south of Cumming's Head, Western Mountains, *Mr. Archer.*

2. Glyphomitrium, *Brid.*

G. acutifolium (Ptychomitrium, *Hook. fil. et Wils.*; *Flor. Tasman. ined.*).
Hab. Tasmania, on rocks, Port Sorrell, *Mr. Archer.*

G. SERRATUM (*Mitten*). *G. polyphyllo* minus, foliis patenti-recurvis e basi ovata lanceolatis sensim acutis margine apicem versus serrato inferne recurvo nervo percurrente, cellulis basi paucis elongatis mox in rotundatas inter se remotiusculas diametro circiter $\frac{1}{4000}$ unciæ metientibus transeuntes, perichætialibus caulinis similibus, theca in pedunculo quadrilineari ovali-cylindrica, operculo subulato subæquilongo, peristomio dentibus longiusculis rubris asperulis profunde fissis basi geminatim approximatis, calyptra *G. crispatæ.*
Hab. Tasmania, rocks north side of the Cataract, Launceston, *Mr. Archer.*

In size and habit so nearly resembling *G. acutifolium* as to be readily mistaken for it, but safely distinguished by the serrated leaves, which are shorter and less narrowed towards the apex than those of *G. polyphyllum.*

G. ADAMSONI (*Mitten*). *G. crispato* simile sed minus, foliis inferne paululum dilatatis lineari-lanceolatis acutis nervo percurrente integerrimis, cellulis basi paucis oblongis parallelogrammaticis cito in parvas rotundatas distinctas diametro circiter $\frac{1}{3000}$ unciæ metientes transeuntibus, perichætialibus nullis a caulinis difformibus, theca in pedunculo trilineari ovali, operculo subulato, peristomio dentibus brevibus cruribus plus minus discretis.
Hab. Australia; common on trap-rocks, Melbourne, *Mr. Adamson,* No. 60.

Smaller than *G. crispatum,* with leaves scarcely wider at the base than they are in the upper part, their cells all distinct, and the capsule shorter.

G. MÜLLERI (*Mitten*). Monoicum, habitu *G. crispati*, foliis e basi lata subquadrata superne paululum dilatata vaginante annotatis patentibus lanceolatis apice obtusis acutatis subcucullatis nervo sub summo apice evanido carinatis margine integerrimo, cellulis basi ad mediam partis latioris oblongis parallelogrammaticis inde ad apicem parvis rotundatis approximatis obscuriusculis diametro circiter $\frac{1}{3000}$ unciæ metientibus, perichætialibus tribus brevioribus ovatis acuminatis acutioribus, theca in pedunculo tri-quadri-lineari ovali ætate corrugata, operculo subulato subæquilongo, peristomio vetusto, et calyptra *G. crispati.*

Hab. Australia, Victoria, Rocky Mountains, called the Glass-houses, Moreton Bay, and Brisbane River, *Dr. Ferd. Müller.*

Densely tufted stems about half an inch high, as thick as those of *G. polyphyllum*, with hard crisped foliage.

G. FERNANDESIANUM (*Mitten*). *G. crispati* simile sed robustius, foliis e basi erectiuscula ovali patentibus lanceolatis acutis incurvis nervo crasso lato percurrente marginibus integerrimis, cellulis basi infima paucis oblongis parallelogrammaticis cito abbreviatis superioribus minutis rotundatis distinctis, diametro circiter $\frac{1}{3000}$ unciæ metientibus, parietibus pellucidis, perichætialibus conformibus, theca in pedunculo trilineari parva ovali-cylindrica, operculo æquilongo subulato, calyptra apice subscabra.

Hab. Insula Juan Fernandez, *Bertero*, 1591; et *Cuming*, 1486.

More robust, but with the same habit and appearance as *G. crispatum*. The capsule is small for the size of the moss. The very thick broad nerve readily distinguishes this species from its allies.

VI. ORTHOTRICHACEÆ.

1. ZYGODON, *Hook. & Tayl.*

Z. Menziesii (Codonoblepharum, *Schw.*).

Hab. Tasmania, on trees in open ground, and in the forests, *Mr. Archer.*

Z. Reinwardti, *Schw.*

Hab. Tasmania, on trees, Stackhouse Falls, *Mr. Archer.*

Z. Brownii, *Schw.*

Hab. Tasmania, on logs and dead trees, copses and rivulets, Cheshunt, *Mr. Archer.*

Z. intermedius, *B. & S.*

Hab. Tasmania, Cheshunt, *Mr. Archer*; Mount Wellington, *Mossman*, No. 758 in part.

2. ORTHOTRICHUM, *Hedw.*

O. Tasmanicum, *Hook. & Wils.*

Hab. Tasmania, Falls Run, *Mr. Archer.*

3. ULOTA, *Brid.*

U. FULVELLA (*Mitten*). Monoica, caule procumbente ramis pluribus brevibus ramoso, foliis, madore, e basi late ovali erecta concava serie unico cellularum oblongarum parenchymaticarum hyalinarum marginata interioribus angustis elongatis luteis patentibus, siccitate subtortis non crispatis, longe angusto lanceolatis nervo sub apice evanido carinatis, margine lævi, cellulis rotundatis diametro $\frac{1}{3000}$ unciæ metientibus, perichætialibus a basi sensim lanceolatis caulinis paululum latioribus erectioribus, theca in pedunculo ea duplo longiore ovali plicata, collo sensim attenuato, peristomio dentibus 8 bigeminatis apicibus secedentibus, interno —?, calyptra ramentis æquilongis luteis. —*Orthotrichum luteolum*, Hook. fil. et Wils. Crypt. Antarct. ex parte.
Hab. Hermite Island. *Dr. J. D. Hooker.*

Like *U. germana*, but rather larger, its leaves not crisped when dry, narrower, the structure of the base different.

U. LOBBIANA (*Mitten*). *U. carinatæ* habitu colore statura crispationeque foliorum simile, foliis angustioribus e basi erectiuscula suborbiculari seriebus pluribus cellularum hyalinarum quadratarum crasse limbatarum marginata interioribus angustis luteis angustatis longe lanceolatis patentibus nervo carinatis marginibus minute erosis, cellulis rotundatis approximatis diametro $\frac{1}{3000}$ unciæ metientibus obscuriusculis minutissime papillosis, perichætialibus caulinis duplo longioribus vaginula nuda, theca in pedunculo ea quadruplo longiore, calyptra ramentis stramineis eam superantibus dense vestita.
Hab. Patagonia and Chiloe, *Mr. Lobb.*

Differs from *U. carinata* in its narrower leaves, with the marginal hyaline cells shorter, thick-walled, and in the naked vaginula.

U. CARINATA (*Mitten*). Monoica, pulvinata, foliis siccitate crispatis madore e basi erectiuscula suborbiculari concava cellulis marginalibus oblongis parallelogrammaticis hyalinis in seriebus pluribus dispositis interioribus elongatis angustis luteis lanceolatis elongatis nervo sub apice evanido profunde carinatis margine minute crenulatis cellulis minutis depressis approximatis latitudine $\frac{1}{2000}$ longitudine $\frac{1}{4000}$ unciæ metientibus minute papillosis obscuriusculis, perichætialibus longioribus latioribus erectioribus vaginula pilosa, theca in pedunculo quadruplo longiore ovali plicata, operculo convexo brevi rostrato, calyptra lævi, peristomio dentibus 8 bigeminatis ciliis 8 capillaribus subæquilongis.
Hab. Chiloe, *Mr. Lobb.*

Rather larger than *U. fulvella*, leaves wider, with cells more densely placed, crisped in drying, base of the leaf shorter than in its allies, capsule without an attenuated neck.

U. MACROCALYCINA (*Mitten*). Monoica, caule repente, ramis brevibus erectis, foliis patentibus siccitate appressis strictis e basi lata obovata erectiuscula concava seriebus cellularum hyalinarum oblongarum parenchymaticarum prosenchymaticarumque marginata interioribus angustis elongatis angustatis brevi-lanceolatis apice obtusiusculis nervo sub apice evanido carinatis integerrimis, cellulis remotiusculis depressis latitudine $\frac{1}{2500}$ longitudine $\frac{1}{5000}$ unciæ metientibus lævibus, perichætialibus exsertis late-lanceolatis erectis obtusis laxe convolutis nervo medio evanido, theca in pedunculo eam duplo superante ovali plicata, operculo conico acuminato, peristomio dentibus 8 bigeminatis, ciliis angustis 8 brevioribus ?, calyptra nuda fusca.

Hab. Straits of Magellan, on trunks of trees, Port Famine, *Dr. Lyall.*

Less than *U. Hutchinsiæ*; the straight cauline and large wide obtuse perichætial leaves readily distinguish it from its allies.

U. EREMITENSIS (*Mitten*). Monoica, cæspitulosa, foliis siccitate vix mutatis patentibus e basi erectiuscula suborbiculari lata concava angustatis lineari-lanceolatis nervo sub apice evanido carinatis margine ad apicem baseos dilatato et inde recurvo minute crenulato cellulis ad baseos latera seriebus pluribus parallelogrammaticis hyalinis interioribus angustis cito in rotundatas diametro $\frac{1}{3000}$ unciæ metientes transeuntibus papillosis, perichætialibus lanceolatis, theca in pedunculo triplo longiore ovali plicata basin versus lævi, peristomio dentibus 8 bigeminatis apicibus liberis ciliis 8 angustis capillaribus subæquilongis, calyptra glabra.

Orthotrichum luteolum, Hook. fil. et Wils. Crypt. Antarct. ex parte.

Hab. Hermite Island, Cape Horn, *Dr. J. D. Hooker.*

A little larger than *U. germana* (Mont.), and with the bases of its leaves a little longer, their cells in the upper part not depressed, the leaves themselves not crisped when dry, and the cilia of the internal peristome capillary.

U. GLABELLA. Monoica, subpulvinata, foliis siccitate appressis subtortis madore e basi erectiuscula suborbiculari concava cellulis marginalibus oblongis parallelogrammaticis hyalinis in seriebus pluribus dispositis interioribus elongatis angustis angustatis longe lanceolatis patentibus nervo sub apice evanido carinatis margine minute crenulato cellulis remotiusculis rotundatis diametro $\frac{1}{3000}$ unciæ metientibus papillosis, perichætialibus paululum latioribus, theca in pedunculo eam duplo superante ovali plicata, collo brevi, calyptra nuda apice rugosa.

Orthotrichum luteolum, var., *Hook. fil. et Wils. Crypt. Antarct.*

Hab. Hermite Island, Cape Horn, *Dr. J. D. Hooker.*

The leaves not crisped in drying and the glabrous calyptra distinguish this from its allies. In size it agrees with *U. germana.* No perfect peristomes have been seen.

U. FUEGIANA (*Mitten*). Monoica, caule procumbente ramoso cæspitulosо, foliis siccitate tortis madore e basi late obovata erectiuscula concava margine cellulis oblongis hyalinis parallelogrammaticis in seriebus pluribus marginata inde angustatis longe lanceolatis patentibus nervo sub apice evanido carinatis, cellulis remotiusculis rotundatis diametro $\frac{1}{3000}$ unciæ metientibus lævibus margine apicem versus eroso, perichætialibus erectioribus paululum latioribus vaginula nuda, theca in pedunculo ea duplo longiore ovali, collo sensim attenuato plicato, peristomio dentibus 8 bigeminatis plus minus fissis, ciliis ——?, calyptra ramentis paucis brevibus appressis pilosa.

Orthotrichum luteolum, *Hook. fil. et Wils. Crypt. Antarct.* quoad iconem calyptræ. O. coarctatum, *Hook. et Grev.*, huc pertinere videtur.

Hab. Hermite Island, Cape Horn, *Dr. J. D. Hooker.*

Very near to *U. fulvella* in habit, size, and in the torsion of its leaves; but the base of its leaves with many series of pellucid marginal cells, the margin towards the apex irregularly erose, and the calyptra with few appressed hairs.

U. Darwinii (*Mitten*). Pulvinata, foliis e basi ovali concava erectiuscula cellulis hyalinis oblongis in seriebus pluribus dispositis interioribus angustis luteis patentibus longe lanceolatis nervo carinatis marginibus minute erosis, cellulis rotundatis remotiusculis diametro $\frac{1}{3000}$ unciæ metientibus sublævibus, perichætialibus longioribus erectioribus paululum latioribus vaginula pilosa, theca in pedunculo eam duplo superante ovali plicata collo sensim attenuato, operculo convexo brevi rostrato, calyptra ramentis brevibus pilosa, peristomio dentibus 8 bigeminatis ciliis 8 capillaribus paululum brevioribus.

Hab. Terra del Fuego, *Mr. Darwin.*

Resembles very closely *U. Fuegiana*, but with larger leaves, which have their cells more closely placed, and the vaginula pilose.

U. lutea (*Mitten*). Monoica, dense pulvinata, fulvo-lutea, foliis siccitate crispatis madore patentibus e basi obovata concava erectiuscula lineari-lanceolatis nervo flavo sub apice evanido carinatis cellulis utrinque ad baseos ovatæ latera circiter quadriseriatis oblongis parallelogrammaticis hyalinis interioribus angustissimis elongatis luteis superioribus rotundis diametro $\frac{1}{3000}$ unciæ metientibus in seriebus 10–12 inter marginem et nervum in folii medio dispositis papillosis margine minute crenulato et ubi basis in partem superiorem angustatur recurvo, perichætialibus lanceolatis latioribus vaginula glabra, theca in pedunculo vix duplo longiore ovali cylindrica plicata collo elongato crassiusculo, operculo convexo brevi-rostrato, peristomio dentibus 8 bigeminatis ciliis 8 angustis tertio brevioribus, calyptra ramentis exstantibus elongatis pilosa.

Hab. Tasmania, on trees, rivulet behind Cumming's Head, Western Mountains, *Mr. Archer*; Mount Wellington, and in New Zealand, Wairoa River, Kaipara, *Mossman.*

Corresponding in size with *U. crispa*, but with leaves of a different form at the base, erose margins, and cells in the upper portion larger and further apart; the capsule is also thinner.

4. MACROMITRIUM, *Brid.*

M. microphyllum (*Hook.*).

Hab. Tasmania, on trees in creeks and damp woods, *Mr. Archer.*

M. PUSILLUM (*Mitten*). Dioicum? *M. microstomo* simillimum, foliis siccitate spiraliter tortis madore patentibus lineari-lanceolatis apice breviter apiculatis nervo fusco sub apice evanido carinatis integerrimis cellulis basi angustis elongatis superioribus rotundatis diametro circiter $\frac{1}{3000}$ unciæ metientibus breviter papillosis distinctis, perichætialibus internis brevioribus ovatis acuminatis, theca in pedunculo circiter trilineari ovali plicata ore intensiore colorato, calyptra nuda.

Hab. On stones, Cataract Hill, Tasmania, *Mr. Archer.*

Leaves longer and narrower than those of *M. microstomum*, with cells far larger than those of the last-named species, having a diameter of $\frac{1}{6000}$th of an inch.

M. LIGULARE (*Mitten*). Dioicum? *M. erosulo* simile, foliis siccitate tortis subcirrhatis linearibus ligulatis obtusis vel nervo excurrente brevissime apiculatis carinatisque cellulis inferne pro spatio brevi ovoideis cito in rotundatas approximatas papillosas obscuriusculas transeuntibus margine erosulo, perichætialibus brevioribus ovatis acutis, theca in pedunculo trilineari ovali circa os intensius colorata et plicata, operculo conico acuminato, calyptra nuda, peristomio simplici dentibus brevibus.

Hab. New Zealand, *Kerr*; Waikeki, *Dr. Sinclair.*

Smaller than *M. prorepens*; leaves more crisped, with cells at their bases of an oblong or ovoid form.

M. EROSULUM (*Mitten*). Dioicum? caule repente, ramis brevibus simplicibus ramulosisve dense stratosis, foliis siccitate compacte tortis incurvisque madore patentibus e basi subelliptica ligulatis obtusis nervo flavo-fusco excurrente breviter mucronatis carinatisque margine papillis prominentibus eroso, cellulis inferioribus elongatis angustis lævibus superioribus apicem versus obscuriusculis grosse papillosis, perichætialibus paululo latioribus acutis, theca in pedunculo circiter trilineari ovali fusca circa os intensius colorata et plicata, operculo subulato subæquilongo, peristomio simplici dentibus brevibus, calyptra ramentis appressis sparsis pilosa.

Hab. New Zealand, *Kerr*; near Wellington, *Stephenson*; Middle Island, *Bidwill*; Waikeki, *Milne.*

In habit, size, and colour similar to *M. prorepens*, but the bases of its leaves narrower, the upper portion longer, more obtuse, the cells larger and less obscure. *M. prorepens* is monoicous.

M. ARCHERI (*Mitten*). *M. hemitrichodi* simillimum, foliis siccitate tortis subcrispatis madore patentibus inferne ellipticis inde lanceolatis obtusiusculis nervo excurrente carinatis brevissime apiculatis

margine minutissime eroso cellulis basi pro spatio brevi elongatis mox in rotundatas transeuntibus papillosis apicem versus obscurioribus, perichætialibus brevioribus duplo latioribus acutis, theca in pedunculo tri-quadrilineari elongato ovali sub ore intensius colorato plicata, peristomio nullo ?, operculo subulato, calyptra nuda.

Hab. On trees, Cheshunt, Tasmania, *Mr. Archer*; on dead branches of trees, Kermandec Rivulet, *Mr. Oldfield.*

Fulvous; in size and general appearance scarcely different from *M. hemitrichodes*, to which at least in part belongs *M. amœnum*, Hornschuch, according to authentic specimens; but in the present, the leaves, although agreeing in form, have their cells more widely separated, rather larger, and not obscure, as in *M. hemitrichodes*, in which too the leaves are smoother.

M. ORTHOPHYLLUM (*Mitten*). Dioicum, *M. longirostri* habitu statura coloreque simile, foliis siccitate appressis strictis madore patentibus late lanceolatis breviter apiculatis nervo excurrente concolori carinatis margine integerrimo cellulis e basi ad medium elongatis angustis inde ad apicem ovoideis latitudine circiter $\frac{1}{4000}$ unciæ metientibus, perichætialibus longioribus latioribus erectis longiore apiculatis, theca in pedunculo circiter sex lineari ovali ore plicato, collo sensim attenuato, operculo subulato subæquilongo, peristomio simplici dentibus brevibus liberis, calyptra nuda.

Hab. New Zealand, *Kerr, Knight.*

Very distinct from all its congeners in the leaves being straight, and, except that they are appressed to the stem, unaltered in drying.

M. Mossmannianum (C. Müller, Bot. Zeit. 1851, p. 561) is identical with *M. gracile*, Hook.

VII. FUNARIACEÆ.

1. EPHEMERUM, *Hampe.*

E. cristatum (Phascum, *Hook. et Wils.*).

Hab. Tasmania, Cheshunt, *Mr. Archer.*

2. LEPTANGIUM, *Mont.*

L. repens (Anictangium, *Hook. Musc. Exot.*).

Hab. Tasmania, Port Sorrell, and north side of Cataract, Launceston, *Mr. Archer.*

This curious moss, which has no affinity with *Hedwigia* nor with *Erpodium*, seems to accord very nearly with Dr. Montagne's description of *L. Perrottetii* from Senegambia, and from the structure of its leaves appears to be more nearly allied to this family than to any other.

3. PHYSCOMITRIUM, *Brid.*

P. CONICUM (*Mitten*). *P. pyriformi* simile, foliisque conformibus serrulatis cellulis fere dimidio minoribus marginalibus intensius coloratis, theca in pedunculo bilineari pyriformi, operculo depresso-conico umbonato.

Hab. Tasmania, Leith's Creek, *Mr. Archer.*

Less than the usual states of *P. pyriforme,* but very similar to it in appearance.

4. ENTOSTHODON, *Schw.*

E. laxus (Physcomitrium, *Hook. fil. et Wils.*).

Hab. Tasmania, on stones, rivulet near Cumming's Head, Western Mountains, *Mr. Archer.*

E. apophysatus (Physomitrium, *Taylor*).

Hab. Tasmania, the Hummocks, *Mr. Archer.*

E. PRODUCTUS (*Mitten*). Monoicus, parvulus, humilis, foliis inferne ovatis in acumen lanceolatum angustatis integerrimis nervo sub apice evanido cellulis elongatis, theca in pedunculo bilineari parva ovali, operculo depresso-convexo umbonato, peristomio nullo?

Hab. Tasmania, behind Cumming's Head, Western Mountains, *Mr. Archer.*

A small species allied in the form of its leaves to *E. Mittenii,* Dzy. et Molk. The fruit too young to exhibit the peristome, if indeed that organ is present.

5. FUNARIA, *Schreb.*

F. radians (Weissia, *Hedw.*).

Hab. Tasmania, the Hummocks, Port Sorrell, bark near Cheshunt, and on rocks north side of Cataract, Launceston, *Mr. Archer.*

F. hygrometrica, *Dill.*

Hab. Tasmania, on stones of fossiliferous limestone, and on the chimney of a cottage, Cheshunt, *Mr. Archer.*

VIII. SPLACHNACEÆ.

1. SPLACHNUM, *L.*

(*Eremodon,* Brid.)

S. octoblepharum, *Hook.* (Dissodon plagiopus, *C. Müller*).

Hab. Tasmania, on cowdung, Sand Hill, on logs, Smith's Creek, *Mr. Archer.*

IX. BARTRAMIACEÆ.

1. BARTRAMIA, *Hedw.*

* *Eubartramia.*

B. Halleriana, *Hedw.* (B. Mossmaniana, *C. Müller, Bot. Zeit.* 1851, p. 552).

Hab. Tasmania, on rocks, Elliott Rivulet, rivulet behind Cumming's

Head, and in a rivulet north side of the Western Mountains, at an altitude of about 2000 feet, *Mr. Archer.*

Notwithstanding the observations of M. C. Müller, there appears to be no real difference between these and European specimens.

** *Vaginella.*

B. papillata, *Hook. fil. et Wils. in Fl. Nov. Zealand.* p. 89, t. 86. f. 4. (B. acerosa, *Hampe, Plantæ Muellerianæ* !)

Hab. Tasmania, east side of Ovens Creek, *Mr. Archer.*

B. FRAGILIS (*Mitten*). Dioica? dense cæspitosa, caule erecto subsimplici, foliis densis fragillimis erecto-patentibus e basi appressa laxe vaginante oblonga superne paululum dilatata ibique tenuiter hyalino marginata laxe areolata subito subulato longe lanceolatis cellulis obscuris densis nervo percurrente margine dorsoque serrulatis, perichætialibus lanceolatis inconspicuis, theca in pedunculo breviusculo rubro globosa plicata erecta, operculo brevi conico, peristomio externo normali interno processibus brevissimis rudimentariis.

Hab. On rocks, rivulet behind Cumming's Head, Western Mountains, Tasmania, *Mr. Archer*; New Zealand, *Mr. Kerr.*

More densely and compactly cæspitose than *B. papillata*, Hook. fil. et Wils. The subulate portion of the leaf wider, less papillose, and not so obscure. The inflorescence appears to be dioicous. The leaves are so densely congested that the vaginant base is not erect, but only appressed to those above it, and the slightest touch suffices to detach them from the stem.

2. PHILONOTIS, *Brid.*

(*Conostomum.*)

P. pusilla. (Conostomum, *Hook. fil. et Wils. in Fl. Nov. Zeland.*)

Hab. Tasmania, on rocks, the Falls, rivulet behind Cumming's Head, Western Mountains, *Mr. Archer.*

P. australis. (Conostomum, *Swartz.*)

Hab. Tasmania, in the same localities as the preceding, but barren, *Mr. Archer.*

Bartramia (*Philonotis*) *curvirostra*, Mitten, collected in Victoria, Australia by Dr. F. Müller; belongs to the same section as the two foregoing species, but is much smaller.

(*Philonotis.*)

P. appressa. (Bartramia, *Hook. fil. et Wils. in Fl. Nov. Zeland.*)

Hab. Tasmania, on rocks, Elliott Rivulet, rivulet near Cumming's Head, Western Mountains, *Mr. Archer.*

P. VAGANS (*Mitten*). Dioica, caule elongato ramoso, foliis patentibus ovatis sensim acutis nervo angusto excurrente marginibus cellulis angustatis subcartilagineis limbatis apicem versus serratis cellulis

omnibus conformibus magnis pellucidis parietibus angustis, perichætialibus e basi latiore lanceolatis, theca in pedunculo elongato rubro horizontali globoso-ovali plicata collo vix ullo, operculo breviter conico, floribus masculis in ramis gracilioribus laxifoliis foliis perigonialibus latis apice obtusiusculis cymbiformi-concavis superne cellulis angustis areolatis.

Bryum vagans, *Hook. fil. et Wils. Crypt. Antarct.*

Hab. Hermite Island, *Dr. J. D. Hooker*; Sandy Point, Magellan, and Chili, *Lechler*, 3063.

This fine moss has been referred by M. C. Müller to *Meesia*; the fertile state is named by M. Schimper, in Lechler's collection, *Philonotis dimorpha*, Schimper, MSS.

3. BREUTELIA, *B. & S.*

B. affinis. (Bartramia, *Hook.*)

Hab. Tasmania, The Falls, *Mr. Archer*.

B. COMOSA (*Mitten*). Dioica, caule erecto ramis pluribus confertis comosis inferne fusco-tomentoso, foliis e basi brevi erecta superne dilatata utrinque ad margines seriebus pluribus cellularum majorum hyalinarum limbatis angustatis lanceolatis patentibus nervo excurrente piliformi mucronatis plicatis margine serrulatis papillosis, perichætialibus e basi sensim angustatis late lanceolatis, theca in pedunculo elongato sesquiunciali ovali inclinata plicata, operculo conico, peristomio normali.

Hab. New Zealand, Manikau Forest, N. Island, *Col. Bolton*. Bay of Islands, *Dr. Jolliffe*. Gathered also by *Dr. J. D. Hooker*, *Mr. Kerr*, and *Mr. Knight*. Tasmania, on rocks and earthy banks, East Creek, and rivulet near Cumming's Head, Western Mountains, *Mr. Archer*. Wellington Falls, Mount Wellington, *Mossman*, 744 in part.

Differs from *B. pendula* in the form of the base of its leaves and of its capsule.

B. DUMOSA (*Mitten*). Dioica, caule erecto ramis confertis dumoso inferne radicellis fuscis intertexto, foliis e basi erecta superne dilatata caulem amplectente cellulis fere omnibus conformibus angustatis lanceolatis patenti-divaricatis plicatis papillosis siccitate non mutatis nervo tenui excurrente mucronatis margine serrulato, perichætialibus ovatis acumine lanceolato, theca in pedunculo erecto breviusculo rarius elongato oblonga nutante plicata, operculo brevi conico, peristomio normali.—*Bartramia pendula*, Hook. fil. et Wils. in Crypt. Antarct. ex parte.

Hab. Hermite Island and Kerguelen's Land, *Dr. J. D. Hooker*. Chiloe, *Lobb*. Chili, *Lechler*, 813 and 809 in part.

Differs from *B. pendula* in the clasping bases of its more divergent leaves, without the band of enlarged cells on each side. In Mr. Lobb's specimens the seta is an inch and a half long; in those collected by Dr. Hooker it is about half an inch.

B. DIVARICATA (*Mitten*). Dioica, caule elongato inferne tomentoso subsimplici, foliis e basi brevi caulem amplectente cellulis hyalinis pluribus ad angulos marginum congestis divaricatis lanceolatis plicatis papillosis margine serrulatis nervo tenui excurrente mucronatis siccitate subflaccidis, perichætialibus ovatis integerrimis nervo angustissimo, theca in pedunculo elongato horizontali oblongo-ovali collo pyriformi attenuato, operculo conico, peristomio normali.

Hab. New Zealand. *Colenso, Dr. J. D. Hooker, Knight, Lyall, Sinclair*; Tasmania, Cheshunt, *Mr. Archer.*

Resembles the larger states of *B. pendula*, but differs in its divaricated leaves, which have, when dry, a subflaccid appearance, a differently formed base, and the stems almost simple.

B. pendula, which has been much misunderstood, varies greatly in its size, being sometimes not larger than the usual states of *Philonotis fontana*, as in the original specimens gathered by Menzies, at others as large as *B. gigantea*, Schwægrichen's figure 161 having been taken from this state; but the capsule is not erect. The *Hypnum elongatum*, Hook. fil. et Wils. in Crypt. Antarct. t. 60, is certainly of this genus, and may be a form of *B. pendula. Hypnum consimile*, Hook. fil. et Wils. in Crypt. Antarct. t. 60, is also to be referred to *Breutelia.*

B. Sieberi, of which some specimens have been gathered by Mr. Oldfield, may be thus characterized:—

B. SIEBERI, *Hornsch. in Musc. Sieber.* No. 12. Dioica, caule procumbente suberectove ramulis brevibus fasciculatis ramoso innovante iterumque ramoso inferne dense radiculoso, foliis haud nitidis e basi brevi erectiuscula ad insertionem contracta patentibus lanceolatis estriatis nervo angusto in acumen setaceo-pungens excurrente marginibus serrulatis inferne recurvis cellulis omnibus elongatis angustis papillosis, perichætialibus conformibus, theca in pedunculo rubro unciali apice flexura angusta pendula ovali plicata, operculo depresso conico, peristomio parvo normali? flore masculo foliis quadruplo latioribus late ovatis patulis nervo superne evanido.

Hab. Tasmania, Mount Wellington, *Dr. J. D. Hooker* and *Mr. Oldfield*; New Holland, *Sieber.*

Stems in all the Tasmanian specimens scarcely exceeding an inch in height; colour of the foliage yellowish-green, without gloss; leaves narrow; cells in the upper portion elongated, everywhere distinctly papillose; alary cells few, indistinct. In all the allied species the cells of the upper portion of the leaf are shortened.

B. PLICATA (*Mitten*). *B. divaricatæ* simillima, foliis siccitate curvatis e basi erecta plicata divergentibus lanceolatis nervo percurrente marginibus arcte serrulatis cellulis basi angustis elongatis pellucidis utrinque ad latera seriebus pluribus hyalinis superioribus quadrato-

oblongis inde rotundatis densissime minutissimeque papillosis subopacis.

Hab. Chili, *Lechler*, 809 in part.

In the curled dry foliage, this agrees with *B. divaricata*; but in the plicate base and minutely papillose subobscure areolation of the upper part of the leaf, it recedes from all the species yet known.

X. BRYACEÆ.

1. ORTHODONTIUM, *Schw.*

O. sulcatum, *Hook. fil. et Wils.*
Hab. Tasmania, on dead trees, West-end Rivulet, *Mr. Archer.*

2. MIELICHHOFERIA, *Hsch.*

M. Eckloni, *Hornsch.*
Hab. Tasmania, Cheshunt, *Mr. Archer.*

3. WEBERA, *Hedw.*

W. nutans, *Hedw.*
Hab. Tasmania, road-side, Splitters Hill, *Mr. Archer.*

4. BRYUM, *L.*

B. cæspiticium, *Hedw.*
Hab. Tasmania, Port Sorrell, *Mr. Archer.*

B. bimum, *Schreb.*
Hab. Tasmania, Cheshunt, *Mr. Archer.*

B. torquescens, *B. & S.*
Hab. Tasmania, Cheshunt, *Mr. Archer.*

B. Tasmanicum, *Hampe.*
Hab. Tasmania, Cheshunt, *Mr. Archer.*

B. Billardieri, *Schw.*
Hab. Tasmania, Cheshunt, *Mr. Archer.* Wellington Falls, *Mossman.*

B. truncorum, *Brid.*
Hab. Tasmania, Cheshunt, *Mr. Archer.*

B. dichotomum, *Hedw.* (B. atropurpureum, *Auct.*)
Hab. Tasmania, rocks, Port Sorrell, burnt ground, plains, &c., *Mr. Archer.*

B. crassum, *Hook. fil. et Wils.*
Hab. Tasmania, Saw Pit Hill, *Mr. Archer.*

B. levigatum, *Hook. fil. et Wils.*
Hab. Tasmania, Cheshunt, a few barren stems, *Mr. Archer.*

XI. HYPNACEÆ.

1. METEORIUM, *Brid.*

M. FULVUM (*Mitten*). Ramis gracilibus flexuosis, ramulis remotis attenuatis flexuosis pinnatis, foliis subnitentibus luteis ætate fulvis patentibus e basi lata cordata alis amplexantibus hastatis sensim tenuiter acuminatis marginibus hic illic undulatis basi ad alas serrulatis superne minutissime serrulatis apicem versus integerrimis nervo brevi infra medium in carinam parvam latiusculam ultra medium exaratam evanido ramulinis minus tenuiter acuminatis distinctius serrulatis cellulis elongatis fusiformibus angustissimis distinctis minutissime papillosis sublævibus.

Hab. Australia, Victoria, Tarwin, *Dr. F. Mueller.*

A slender species, allied to the Indian *M. aureum,* but with its leaves attenuated into longer points.

2. HYPNUM, *Dill.*

* *Brachythecium,* Schimp.

H. rutabulum, *L.*

Hab. Tasmania, on trees, Long Hill, *Mr. Archer.*

H. paradoxum, *Hook. fil. et Wils.*

Hab. Tasmania, Cheshunt, *Mr. Archer.*

H. campestre, *B. & S.*

Hab. Tasmania, near Woolmers, *Mr. Archer.*

H. aristatum, *Hook. fil. et Wils. Fl. Tasmanica ined.*

Hab. Tasmania, *Mr. Archer.* New Zealand, *Mr. Knight.*

In size resembling *H. Buchanani,* but in the form of its leaves allied to *H. Vaucheri* and to *H. piliferum,* and agreeing with them in the cell-structure of its leaves and rostrate operculum.

** *Rhynchostegium et Eurhynchium,* Schimp.

H. ASPERIPES (*Mitten*). Monoicum, caule procumbente, ramis pinnatis, foliis patentibus latissime ovatis acuminatis serrulatis nervo tenui medio evanido cellulis longitudine circiter $\frac{1}{400}$ latitudine $\frac{1}{3000}$ unciæ metientibus, perichætialibus latis in acumen breve attenuatis, theca in pedunculo sub-unciali aspero oblongo-ovali horizontali, operculo longirostrato, peristomio normali.

Hab. Tasmania, Cheshunt, *Mr. Archer.*

More densely branched and with more acuminated leaves than *H. hians,* Hedw., to which in size and general appearance it is nearly allied.

H. tenuifolium, *Hedw.*

Hab. Tasmania, on stones and logs, Tent's Creek, *Mr. Archer.*

This species appears to be frequent in Tasmania and New Zealand, some of the specimens from whence agree exactly with Hedwig's figure in the 'Species Musc.'

3. TRACHYLOMA, *Brid.*

* *Caulis simplex.*

T. subbasilaris. (Hypnum, *Hook. Musc. Exot.*)
Hab. Tasmania, *Mr. Archer.*

** *Caulis dendroideus.*

T. comosa. (Hypnum, *Schw.*)
Hab. Tasmania, on stones in rivulets, Cheshunt, *Mr. Archer.*

T. arcuata. (Hypnum, *Hedw.*; H. spininervium, *Hook. Musc. Exot.*)
Hab. Tasmania, on the ground, and on stones in the beds of rivulets, Cheshunt, *Mr. Archer.*

In this species the superior or dorsal series of leaves are smaller than those of the lateral series; but it does not follow that it is to be referred to *Rhacopilum*, as has been supposed by M. C. Müller; for in every other particular, excepting the furrowed capsule, the species of this group are remote from that genus. Bridel's genus *Trachyloma* is adopted in preference to the creation of a new one to include the species here enumerated and a few others, which, although they do not in all respects entirely agree with *T. planifolia*, yet offer no prominent character whereby they may be distinguished. The nerve which in the cauline leaves of *T. planifolia* is imperceptible, is distinct in the leaves of the ramuli, although very slender. *Trachyloma* therefore agrees in structure with *Hypnum*, but differs in habit, the branches arising from a creeping leafless (?) rhizoma.

T. ARCHERI (*Mitten*). Dioica, ramis erectis inferne simplicibus sparse foliosis superne ramulis patentibus distichis pulchre pinnatis plumiformibus in frondem brevem subtriangularem dispositis, foliis bifarie compressis ovato-lanceolatis acutis nervo percurrente dorso apice denticulato marginibus simpliciter serratis cellulis longitudine circiter $\frac{1}{500}$ latitudine $\frac{1}{4000}$ unciæ metientibus dorso minute papilloso punctatis, seriebus foliorum in latere dorsali minoribus sed conformibus, perichætialibus e basi late ovata tenui acuminatis erectis, theca in pedunculo vix unciali horizontali oblonga sulcata, operculo longicurvi-rostrato, peristomio normali.
Hab. Ovens Creek, Tasmania, *Mr. Archer.*

Two or three inches in height, pale yellowish green, shining. Nearly allied to *T. arcuata*; but its branches are more regularly disposed, forming a subtriangular frond, and readily distinguished by its minutely dotted leaves and short capsule.

T. KERRII (*Mitten*). *T. arcuatæ* similis, stipite plus minus elongato, apice ramis brevibus pinnatis in frondem brevem subrotundatum dense confertis, foliis rameis homomorphis ovatis acutis nervo tenui excurrente dorso spinoso dentato mucronatis marginibus superne breviter simpliciterque spinoso dentato cellulis angustis elongatis basi flavis

alaribus nullis, perichætiis ad basin ramorum copiosis foliis erectis e basi ovata sensim lanceolatis attenuatis superne serrulatis nervo in exterioribus obsoleto in interioribus tenuissimo infra apicem evanido, theca in pedunculo sub-unciali ovali inæquali horizontali lævi, operculo conico rostro brevi, peristomio normali.

Hab. New Zealand, near Wellington, *Stephenson.* Waikeki, *Dr. Sinclair* and *Mr. Kerr.*

Habit, size, and colour of *T. arcuata,* but with more tufted branches, and leaves not of different forms, the capsule not more than half so long, and not furrowed.

4. STEREODON, *Brid.*

* *Cupressiformes.*

† *Operculum brevirostre.*

S. cupressiformis, *Brid.,* var. Mossmani. (Hypnum Mossmanianum, *C. Müller, Bot. Zeit.* 1851, p. 565.)

Hab. Tasmania, on trees and logs, *Mr. Archer.*

If this moss were, as described by C. Müller, truly monoicous, it might be safely distinguished from *S. cupressiformis,* but male flowers are not present in any of the specimens yet examined.

S. chrysogaster (Hypnum, *C. Müller.* H. patale, *Hook. fil. et Wils.*).

Hab. Tasmania, Cheshunt, on logs, *Mr. Archer.*

†† *Operculum longirostre.*

S. curviculatus. (Hypnum, *Hook. fil. et Wils.*)

Hab. Tasmania, Cheshunt, *Mr. Archer.*

S. cyparoides, *Brid.*

Hab. Tasmania, Cheshunt, on logs, frequent, *Mr. Archer.*

S. contiguus. (Hypnum, *Hook. fil. et Wils. Fl. Tasmanica.*)

Hab. Tasmania, on logs and upon the ground, *Mr. Archer* and *Mr. Oldfield.* New Zealand, *Dr. Sinclair.*

Allied to *S. microcarpus* (Hypnum, *C. Müller*) and to *S. brachycarpus* (Hypnum, *Hampe*), but with more spicular leaves of a different outline.

S. JOLLIFFII (*Mitten*). Monoicus, *S. Loxensi* habitu staturaque similis, ramis apicibus cuspidatis, foliis patentibus laxe imbricatis ovali-ellipticis acuminatis concavis obsolete binerviis enerviisve integerrimis vel apice subserrulatis cellulis angustis elongatis alaribus utrinque tribus majoribus hyalinis, perichætialibus interioribus tribus erecto-patentibus caulinis conformibus, theca in pedunculo gracili parva ovali inclinata horizontalive, operculo rostro æquilongo, peristomio dentibus flavis processibus solidis ciliis in uno breviore coalitis in membranam ad $\frac{2}{5}$ exsertis annulo simplici.

Hab. Tasmania, on stones and the earth, Western Creek, *Mr. Archer.* New Zealand, *Jolliffe, Sinclair, Kerr.*

Very much like *S. Loxensis* (Hypnum), Hook., but with a leaf of a different form.

** *Isothecium.*

S. cochlearifolius. (Hypnum, *Schw.*)
Hab. Tasmania, on rocks, Elliott Rivulet.

S. deflexus. (Hypnum, *Wils. MSS. olim.*)
Hab. Tasmania, on the ground, rivulet at Cheshunt, and on logs, Western Creek, *Mr. Archer.*

S. gracilis. (Isothecium, *Hook. fil. et Wils.*)
Hab. Tasmania, stones in rivulets, Jackey's Plain Creek, *Mr. Archer.*

S. ANGUSTATUS (*Mitten*). Dioicus? ramis inferne simplicibus foliis appressis superne in frondem planiusculam dendroideam dense bi-tri-pinnatam divisis, foliis patentibus subcompressis anguste ovali-ellipticis brevi-acuminatis acutis concavis lateralibus complicatis integerrimis breviter binervatis, ramulinis anguste ellipticis superne serrulatis, cellulis angustis omnibus conformibus, perichætialibus e basi ovata convoluta subulatis patentibus, theca in pedunculo brevi ovali horizontali, peristomio normali?
Hab. New Zealand, near Wellington, *Stephenson*; and elsewhere, *Kerr, Lyall, Knight.*

Stems one and a half to two inches in height; habit that of *S.* (*Isothecium*) *arbuscula* and *S.* (*I.*) *deflexus*, but smaller in all its parts; leaves more narrow. Only one perfect peristome has been seen, and this appears to be normal.

S. lagurus. (Leucodon, *Hook. Musc. Exot.*)
Hab. Tasmania, Cheshunt, *Mr. Archer.*

The peristome of this moss is simple by reason of the external teeth being obsolete.

S. mollis. (Leskea, *Hedw.*)
Hab. Tasmania, Cheshunt, *Mr. Archer.*

*** *Plagiothecium*, Schimp.

S. Donianus. (Hypnum Donianum, *Smith.*)
Hab. Tasmania, Cheshunt, *Mr. Archer.*

This species has been confounded with *S. denticulatus*, but in the substance of its leaves it differs.

**** *Cylindrothecium.*

S. auriculatus. (Hypnum, *Mont.*)
Hab. Tasmania, on logs, Western Creek, *Mr. Archer.*

***** *Achyrophyllum.*

Rami erecti, elongati, ramosi. *Folia* lata, nitentia, concava, paleiformia. *Theca* plicata, operculo longi-rostrato. *Florescentia* dioica.

S. acicularis. (Hypnum, *Brid.*)
Hab. Tasmania, Cheshunt, *Mr. Archer.*

S. sciuroides. (Leskea, *Hook. Musc. Exot.*)
Hab. Tasmania, trees in creeks, *Mr. Archer.*

To this group, of which *S. acicularis* is the type, belong *S. densifolius* (Hypnum, *Brid.*), from Tristan d'Acunha and New Zealand, *S. ptychocarpon* (Hypnum, *Schw.*), *S. ericoides*, and *S. Lyallii*, Mitten (Leucodon nitidus, *Hook. fil. et Wils. in Fl. New Zealand*). All these agree in habit, ramification, the red colour of their stems, and thin, pale, chaff-like leaves and plicate capsules. *S. ericoides* and *S. sciuroides* in the Fl. of New Zealand are joined with *Neckera setosa*, Hook. Musc. Exot., to form the genus *Cladomnion*; but the last-named species is in structure altogether different, and is in fact a *Spiridens.*

Achyrophyllum differs from *Hylocomium*, Schimp., in its ramification not being pinnate, and its plicate capsules. From *Plagiothecium* it differs in its leaves not being obliquely inserted and its erect stems.

5. SAULOMA, *Hook. fil. et Wils.*

S. tenella, *eorund.*
Hab. Tasmania, on logs near Cheshunt, and on rocks, Jackey's Plain Creek, *Mr. Archer.*

XII. NECKERACEÆ.

1. NECKERA, *Hedw.*

* *Euneckera.*

N. hymenodonta, *C. Müller, Bot. Zeit.* 1851, p. 564.
Hab. Tasmania, rivulets and damp copses, on trunks and branches of trees, *Mr. Archer.*

** *Thamnium.*

N. RIVALIS (*Mitten*). Dioica, humilis, ramis arcuatis parce bipinnatis apice sæpe productis stoloniferis, foliis distichis patentibus spathulatis acutis nervo ultra medium evanido margine latere inferiore anguste incurvo superne serrulatis ramulinis ellipticis magis serrulatis, cellulis inferne elongatis superne ovoideis rotundatis parvis, perichætialibus e basi lata ovata brevissime nervata subulatis longe attenuatis, theca in pedunculo elongato ovali horizontali, operculo subulato rostrato, peristomio interno ciliis binis appendiculatis inter processus perforatos dentium longitudine in membrana ad $\frac{2}{5}$ eorum longitudinis exserta.

Isothecium pumilum, *Hook. fil. et Wils. Fl. Tasm.* t. 175. f. 7.
Hab. Tasmania, on stones, copse by West End Rivulet, on rocks by rivulets and Stackhouse Falls, *Mr. Archer.*

Allied to *Omalia oblongifolia*, Hook. fil. et Wils., but larger, less densely branched, leaves acute, and peristome more developed.

XIII. LESKEACEÆ.

1. HEDWIGIA, *Ehrh.*

H. ciliata, *Ehrh.* (Pilotrichum, Cryphæa, Dichotomaria, microcyatheum, *C. Müller, Bot. Zeit.* 1851, p. 564.)

Hab. Tasmania, on rocks, O'Farrell's Hill, *Mr. Archer.* Near Launceston, *Mossman*, No. 830.

There appears to be no appreciable difference between these and European specimens.

H. imberbis, *Spruce.*

Hab. Tasmania, Cheshunt, on rocks, *Mr. Archer.*

H. Humboldti, *Hook.*

Hab. Tasmania, Cheshunt, *Mr. Archer.*

2. CRYPHÆA, *Brid.*

C. TASMANICA (*Mitten*). Monoica, ramis elongatis inferne sæpe denudatis superne ramulis brevibus ut plurimum fertilibus dense approximatis, foliis patentibus orbiculari-ovatis acutis nervo sub summo apice evanido margine e medio ad apicem minutissime sed dense serrulato nullibi recurvo cellulis minutis ovoideis ad basin angustis elongatis, perichætialibus e basi ovali subulatis thecam ovatam longe superantibus, operculo convexo acuto, peristomio interno processibus angustis dentium longitudine in membrana brevissima annulo duplici.

Hab. Tasmania, on rocks, Jackey's Plain Creek, *Mr. Archer.*

More robust than *C. dilatata* or *C. Mülleri*, the margins of its leaves not recurved below, and the perichætial leaves more subulate, but of the same habit and colour.

C. CRENULATA (*Mitten*). Monoica, ramis pinnatis, foliis late-ovalibus acutis obtusisve concavis nervo paulo ultra medium evanido margine apice crenulato inferne recurvo cellulis minutis ovoideis basi elongatis, perichætialibus convolutis thecam paululo superantibus acuminatis apicibus erosis, theca ovali, operculo conico acuminato.

Hab. Victoria, Tarwin, *Dr. F. Mueller*, No. 107.

Habit of the branches more nearly that of *C. patens*, but closely allied to *C. dilatata*, and, like it, probably a riparial species; from this, however, it differs in the shorter nerve of the leaves, more robust habit, and more shortly acuminated perichætial leaves.

3. TRACHYPUS, *Schw.*

T. HORNSCHUCHII (*Mitten*). Caule repente, ramis longissimis pendulis flexuosis subpinnatim ramosis, foliis e basi cordata caulem amplexante marginibus minute crenulatis ovatis brevi-apiculatis integerrimis nervo apicem versus evanescente carinatis bistriatis e cellulis minutissimis subopacis margine pellucidioribus rotundatis areolatis, perichætialibus ovato-lanceolatis, theca in pedunculo brevi basi paraphysibus longe

exsertis ovali, operculo subulato longi-rostrato peristomio *T. nigrescentis.*

Meteorium cuspidiferum, *Tayl. MSS.*; *Hook. fil. et Wils. in Fl. New Zealand,* p. 101. Pilotrichum nigrescens, *Hsch. in Musc. Sieber.*

Hab. Tasmania, Cheshunt, *Mr. Archer.* New Zealand, *Messrs. Knight, Kerr, Jupp, Stephenson, Colenso,* and *Dr. Lyall.* Found also in Australia, New Holland, *Sieber,* and the Pacific Islands.

The original *Neckera cuspidifera,* Taylor, MSS., is an East Indian species, which, although very nearly resembling the present species, has its leaves narrowed from a subquadrate base, and the narrowed portion obtusely sharpened, forming a wide point; the whole plant is also much more rigid. The capsules resemble those of *T. nigrescens,* with which also the peristome, so far as has yet been observed, appears to correspond; but the form of the leaves is very different, and the whole moss generally more robust.

T. CERINUS (*Mitten*). *T. Hornschuchii* similis sed robustior, ramis ramulis copiosioribus pinnatis foliis ambitu ovatis basi cordatis alis amplexantibus serrulatis deinde sensim apicem versus angustatis apice brevi-acuminatis nervo sub apice evanido vix carinatis haud plicatis margine medio sinuato recurvo integerrimo cellulis ad marginem pallidioribus elongatis cæteris abbreviatis obscuris inferioribus pallidioribus.

Neckera cerina et N. luteola, *Taylor MSS. in Herb. Greville.* Meteorium cuspidiferum, ex parte, *Hook. fil. et Wils. in Fl. New Zealand,* p. 101.

Hab. Tasmania, on trees in creeks, *Mr. Archer.* Australia, *Mr. Bidwill* and *Dr. F. Mueller.* Also in New Zealand.

More robust than *T. Hornschuchii,* but with the same habit and pale-green or yellowish colour. The leaves have their nerve narrower and thinner, and the cells for several series at the margin are paler and elongated; by this particular, and the sinuation of the leaf about the middle, the species is easily distinguished from the preceding.

T. flexicaulis. (Pilotrichum, *Tayl. MSS.* Meteorium flexicaule, *Hook. fil. et Wils. in Fl. New Zealand,* p. 101. Pilotrichum croceum, *Hampe? in Linnæa,* 1852.)

Hab. Tasmania, *Mr. Archer.* Found also in New Zealand and in S. America on *Cinchona lancifolia.*

It is not possible to determine if M. Hampe's name belongs to this or to one of the other Tasmanian species, the description being insufficient.

4. LESKEA, *Hedw.*

L. hispida. (Hypnum, *Hook. fil. et Wils.*)

Hab. Tasmania, bank by a waterfall, fossiliferous limestone, Cheshunt, *Mr. Archer.*

L. UMBROSA (*Mitten*). Dioica, caule procumbente breviusculo vage ramoso, foliis patentibus subsecundis siccitate vix mutatis e basi paululum latiore subovata angustatis ligulari-lanceolatis apice acuminatis apiculo longiusculo nervo crassiusculo in apiculo evanido margine superne minute serrulato, cellulis minutis subobscuris diametro circiter $\frac{1}{4000}$ unciæ metientibus, perichætialibus e basi latissime ovata subulato-attenuatis nervo percurrente marginibus utrinque uni-bi-dentatis cæterum integerrimis, theca in pedunculo sub-semiunciali rubro ovali horizontali, peristomio normali.

Hab. New Zealand, *Kerr*.

Stems about one inch long, with a few irregular branches. At first sight it might readily be passed over as a small or young state of *L. hispida*, which it very nearly resembles in habit and colour, but its leaves are of a very different form.

L. FULVASTRA (*Mitten*). *L. delicatulæ* habitu statura colore ramificationeque simillima, foliis caulinis patenti-recurvis e basi late hastato-ovata acuminatis planiusculis tenuiter biplicatis nervo concolori excurrente margine hic illic crenulato vix serrulato basin versus recurvo, cellulis distinctis limitibus latiusculis rameis late cordatis acuminatis concavis subserrulatis ramulinis ovatis acutis laxe imbricatis serrulatis nervo sub apice evanido dorso breviter papillosis, perichætialibus erectis ovatis acumine lanceolato recurvo nervo tenui percurrente margine superne filis elongatis ciliato, theca in pedunculo elongato rubro cylindrica curvata inclinata, operculo subulato-rostrato, peristomio normali interno, ciliis tribus inter processus positis.

Hypnum furfurosum, *Hook. fil. et Wils. ex parte.*

Hab. New Zealand, *Col. Bolton, Kerr, Knight, Milne, Dr. F. Mueller.* Also in Tristan d'Acunha, *Milne.*

L. LÆVIUSCULA (*Mitten*). Dioica, *L. tamariscinæ* simillima, caule foliolis brevibus dense vestito, foliis ejusdem latitudinis subæquilateri-triangularibus nervo crasso concolori in acumen angustum elongatum flexuosum excurrente marginibus inferne recurvis integerrimis cellulis minutis subobscuris læviusculis rameis basi ovatis acuminatis obtusiusculis concavis ramulinisque ovato-oblongis compressis obtusis obscuris subintegerrimis minutissime papillosis sublævibus, perichætialibus erectis pallidis ovato-lanceolatis in acumen elongatum flexuosum subserrulatum attenuatis margine apicem versus partis latioris ciliato, theca in pedunculo elongato rubro cylindrica arcuata horizontali, peristomio normali.

Hab. New Zealand, near Wellington, *Stephenson.* Milford Sound, *Dr. Lyall*; and elsewhere, *Kerr.* Forests, Wairoa River, Kaipara, *Mossman*, No. 742. Cheshunt, *Mr. Archer.*

Size, habit, and colour of *L. tamariscina*, but with leaves more nearly resembling those of *L. cymbifolia* (Hypnum, *Dzy. et Molk.*), having the nerve excurrent into a long flexuose slender point, and scarcely anywhere

serrulate or papillose. The cauline and rameal leaves with longer points, the margins of the former scarcely serrulate; and the ciliated perichætial leaves suffice to distinguish this from the *L. delicatula* of the Northern hemisphere.

L. hastata. (Hypnum, *C. Müller.*)
Hab. Tasmania, on stones by rivulets, Ovens Creek, and Cumming's Head, Western Mountains, *Mr. Archer.*

5. RHACOPILUM, *Brid.*

R. strumiferum, *C. Müller, Bot. Zeit.* 1851, p. 563. (R. australe, *Hook. fil. et Wils. in Fl. New Zealand.*)
Hab. Tasmania, Cheshunt, *Mr. Archer.*

R. cristatum, *Hook. fil. et Wils. in Fl. New Zealand.*
Hab. Tasmania, *Mr. Archer.*

R. LÆTUM (*Mitten*). Dioicum? statura *R. spectabile* æmulans, læte luteo-viride, foliis ventralibus elliptico-ovatis acutis basi paululum asymmetricis dorsalibus ovatis sensim acutis nervis concoloribus in mucrones setiformes excurrentibus marginibus minute subserrulatis, cellulis ovoideis rotundatisque intermixtis distinctis lævibus pellucidis, perichætialibus erectis ovatis acuminatis, paraphysibus brevibus inclusis, theca in pedunculo elongato trigono rubro cylindracea arcuata plicata subhorizontali ore obliquo basi strumuloso, operculo subulato-rostrato, peristomio normali?, calyptra parce pilosa.
Hab. New Zealand, *Mr. Kerr* and *Dr. Sinclair.*

Intermediate in size between *R. tomentosum* and *R. spectabile*, but approaching nearest to the latter; leaves thin and less rigid than in the other New Zealand species.

XIV. MNIACEÆ.

1. FISSIDENS, *Hedw.*

F. adiantoides, *Hedw.*
Hab. Tasmania, small island at the foot of Top Paddock, Woolmers, *Mr. Archer.* Sterile.

F. rigidulus, *Hook. fil. et Wils.*
Hab. Tasmania, Tent Rivulet, Cheshunt, on rocks, Stackhouse Falls, *Mr. Archer.*

F. tenellus, *Hook. fil. et Wils.*
Hab. Tasmania, Sandstone Hill, *Mr. Archer.*

F. Taylori, *C. Müller.* (F. pygmæus, *Taylor.*)
Hab. Tasmania, on the earth, in copses, forests, &c., Cheshunt, *Mr. Archer.*

F. pallidus, *Hook. fil. et Wils. Fl. New Zealand,* t. 83. f. 7.
Hab. Tasmania, Cataract Hill, *Mr. Archer.*

F. INTEGERRIMUS (*Mitten*). Dioicus? caule humili cæspitoso ramoso, foliis plurijugis in frondem linearem approximatis patentibus lineari-lanceolatis apice obtusiusculis nervo concolori sub apice evanido lamina vera apice ad medium producto inæquali uno latere rotundato dorsali basi sensim angustato, omnibus laminis immarginatis integerrimis cellulis diametro circiter $\frac{1}{3000}$ unciæ metientibus limitibus crassiusculis, perichætialibus conformibus, theca in pedunculo brevi apicali crassiusculo suberecta brevi ovali, operculo subulato breviore.

Hab. Tasmania, Cheshunt, *Mr. Archer.*

Half an inch high. Seta scarcely two lines long. In general appearance nearly allied to *F. pallidus*, but its leaves are entire, the cells smaller with thicker walls, male flowers absent. In the few specimens yet seen, the plants are, above brownish yellow, below black.

2. MNIOPSIS, gen. nov.

Acrocarpica. Folia cellulis hexagonis areolata. *Peristomium* externum dentibus 16; internum processibus alternantibus e membrana exsertis. *Calyptra* mitriformis parva.

M. PLUMULA (*Mitten*). Dioica, gregaria, caulibus simplicibus erectis inferne foliis minutis remotis superne majoribus in caule fertili horizontaliter insertis patentibus ovatis comalibus perichætialibusve ligulatis obtusis, in caule sterili distichis verticalibus oblongo-ovatis acutis obtusisve patentibus decurrentibus omnibus integerrimis nervo sub apice evanido cellulis hexagonis limitibus crassiusculis, theca in pedunculo bilineari gracili ovali cylindrica æquali, operculo subulato recto, peristomio externo dentibus longissimis angustis rubris siccitate incurvis cirrhatisque, interno processibus ciliiformibus brevibus in membrana brevi exserta, flore masculo fœmineo similis in caulium apicibus parvo capituliformi, antheridiis minutis brevibus, paraphysibus nullis.

Hab. Tasmania, below the quarry, Ovens Creek.

Stems from one-fourth to half an inch high, dull green, considerably resembling some small species of *Fissidens*; its affinity is, however, to *Schistostega*, with which it agrees in the vertical insertion of the leaves of its barren stems, but recedes in the presence of a rather stout nerve and the regular hexagonal cells. In the structure of its peristome it approaches to *Aulacomnion*. The calyptra is smaller in proportion than that of *Tetraphis* or *Tetrodontium*.

3. LEPTOSTOMUM, *R. Brown.*

L. inclinans, *R. Brown.* (L. flexipile, *C. Müller, Bot. Zeit.* 1851, p. 547.)

Hab. Tasmania, Cheshunt, *Mr. Archer.*

4. AULACOMNION, *Schw.*

A. Gaudichaudi. (Leptotheca, *Schw.*)

Hab. Tasmania, on rocks, The Falls, and Sandstone Hill, *Mr. Archer.* Wellington Falls, Mount Wellington, *Mossman.*

5. HYMENODON, *Hook. fil. et Wils.*

H. pilifer, *eorund.*

Hab. Tasmania, Cheshunt, *Mr. Archer.*

6. RHIZOGONIUM, *Brid.*

R. distichum, *Brid.* (R. Mülleri, *Hampe in Plantæ Muellerianæ* !)

Hab. Tasmania, on stones by rivulets, Smith's Creek, *Mr. Archer.* Mount Wellington, *Mossman.*

R. Novæ-Hollandiæ, *Brid.*

Hab. Tasmania, on dead trees, Western Creeks and West-end Rivulet, *Mr. Archer.* Mount Wellington, *Mossman,* No. 756.

R. Hookeri, *C. Müller.* (R. Mossmanianum, *ejusd. Bot. Zeit.* 1851, p. 547.)

Hab. Tasmania, on rocks, Elliott Rivulet and elsewhere, *Mr. Archer.*

There appears to be no real difference between these two reputed species; the difference in aspect probably arises from locality. Other and larger specimens than Mossman's have been received from New Zealand.

R. spiniforme, *Brid.*

Hab. Tasmania, Cheshunt, *Mr. Archer.* Mount Wellington, *Mossman,* No. 753 part.

7. DALTONIA, *Hook. et Tayl.*

D. NOVÆ-ZELANDIÆ (*Mitten*). Monoica, *D. splachnoidi* simillima, foliis elliptico-lanceolatis acuminatis, nervo sub apice evanido profunde carinatis alis convexis marginibus recurvis cellulis ovoideis basi paululum longioribus apice minoribus margine tenui inconspicuo, perichætialibus parvis ovatis, theca in pedunculo superne subscabro globoso-ovali inclinata, operculo subulato, calyptra lævi, fimbriis ad thecæ medium descendentibus.

Hab. New Zealand, ravines near Wellington, *Stephenson.*

Stems, in the very small quantity of this species yet seen, half an inch high; in other respects similar in appearance to *D. splachnoides*; but the upper part of the leaf wider, not gradually narrowed, but rather abruptly acuminated, with shortened cells and the margin recurved.

8. MNIADELPHUS, *C. Müller.*

M. microcarpus. (Hookeria, *Hook.*)

Hab. Tasmania, rivulets, Ovens Creek, Cheshunt, and Tent Creek, *Mr. Archer.*

M. pulchellus. (Hookeria, *Hook. fil. et Wils.*)

Hab. Tasmania, on rocks, rivulet near Cumming's Head, Western Mountains, *Mr. Archer.*

M. crispulus. (Hookeria, *Hook. fil. et Wils.*)
Hab. Tasmania, rivulet behind the Sawpit, Smith's Creek, *Mr. Archer.*

9. PTERYGOPHYLLUM, *Brid.*

P. nigellum, *Hook. fil. et Wils.*
Hab. Tasmania, rocks in rivulets and creeks, *Mr. Archer.*

P. OBSCURUM (*Mitten*). Caule bi- tri-pollicari latitudine cum foliis fere trilineari parce ramoso, foliis disticho-compressis lateralibus patentibus late elliptico-spathulatis angulo apicali obtuso basi angustatis intermediis patentibus dimidio brevioribus subtrapezoideis obtusis duobus cauli parallelis mediis dorsalibus et ventralibus erectis appressis late obovatis apice rotundatis omnibus foliorum nervo ad medium brevi-furcato evanido marginibus superioribus crenulato-serratis cellulis partis superioris circiter $\frac{1}{900}$ unciæ diametro metientibus.
Hab. Tasmania, Cheshunt, *Mr. Archer.*

Whole plant obscure blackish green. Allied to *P. denticulatum* and *P. nigellum*, but with its lateral leaves very much narrowed towards the base, and these, as well as the intermedial and medial, of a different form. The species of this genus, from neglect in the descriptions of the very different forms of their leaves in the several series, are hardly intelligible.

XV. HYPOPTERYGIACEÆ.

1. CYATHOPHORUM, *Brid.*

C. bulbosum. (Anœctangium, *Hedw.*)
Hab. Tasmania, Cheshunt, *Mr. Archer.*

2. HYPOPTERYGIUM, *Brid.*

H. Novæ-Zelandiæ, *C. Müller, Bot. Zeit.* 1851, p. 562. (H. Smithianum, *Hook. fil. et Wils. in Fl. New Zealand.*)
Hab. Tasmania, on living trees, Western Creek, and by rivulets, *Mr. Archer.*

H. Struthiopteris, *Brid.* (Lopidium pallens, *Hook. fil. et Wils. in Fl. New Zealand.*)
Hab. Tasmania, in creeks, *Mr. Archer.*

XVI. BUXBAUMIACEÆ.

1. BUXBAUMIA, *Hall.*

B. TASMANICA (*Mitten*). *B. indusiatæ* simillima, foliis parvis ciliatis, pedunculo nitido subscabro, theca suberecta ovata superficie superiore planiuscula immarginata inferiore convexa, operculo conico.
Hab. Tasmania, Cheshunt, *Mr. Archer.*

Closely resembling *B. indusiata*, but differing in its nearly smooth shining seta. Peristome apparently composed of smooth bladdery cells, scarcely free from the internal membrane. All the capsules yet seen, although fully formed, are too immature to show the perfectly developed peristome, or whether the external capsular wall rolls off as in *B. indusiata.*

XVII. POLYTRICHACEÆ.

1. ATRICHUM, *Beauv.*

A. ligulatum, *Mitten.*
Hab. Tasmania, *Mr. Archer.*

This is probably the *Catharinea Mülleri*, C. Müller et Hampe, but it has not yet been compared with their description.

2. PSILOPILUM, *Brid.*

P. crispulum, *Hook. fil. et Wils. Fl. New Zealand*, pl. 87. f. 3.
Hab. Tasmania, Western Mountains, *Mr. Archer.*

P. australe, *Hook. fil. et Wils. l. c.*
Hab. Tasmania, on stones and on the earth, rivulet behind Cumming's Head, Western Mountains, *Mr. Archer.*

3. POGONATUM, *Brid.*

P. alpinum, *L.*
Hab. Tasmania, The Falls, and rivulet behind Cumming's Head, Western Mountains, *Mr. Archer.*

4. POLYTRICHADELPHUS, *C. Müller.*

P. MAGELLANICUS (*L.*, emend.). Caule subsimplici vel fastigiatim ramosissimo, foliis siccitate appressis incurvis subsecundisve humidis e basi erecta convoluta subquadrata cellulis elongatis pellucidis superne in minutas incrassatas subito transeuntibus patentibus angustatis brevi-lineari-lanceolatis apice crassiusculo acutis lamellis obtectis margine in parte lanceolata dentatis dorso sublævibus, perichætialibus caulinis similibus vaginula pilosa, theca in pedunculo elongato inclinata horizontalive ovata bi-angulato superne plano subconcavo inferne convexo, operculo subulato, calyptra apice setulosa basi nuda vel pilis paucis vestita (*Hedw. Sp. Musc.* t. 20. fig. 1. tantum!; *Hook. fil. et Wils. Crypt. Antarct.* pl. 59. t. 3).
Catharinea (Polytrichadelphus) innovans, *C. Müller, Bot. Zeit.* 1851, p. 548.
Hab. Tasmania, Cheshunt, *Mr. Archer.* Mount Wellington, *Mossman*, No. 752; intermixed with *Polytrichum juniperinum.* Found also in New Zealand, Fuegia, and Campbell's Island.

Great confusion exists amongst the species of this group, whose capsules are inclined, bi-angular, plane or concave above and convex below, like those of *Lyellia* and *Buxbaumia*. The figure in "Hedwig Sp. Musc." fairly represents this moss, so far as relates to the entire plant; in the figure in "Crypt. Antarct." the capsules are not depicted with the two angles, and the outline of the leaf is not quite correct. M. C. Müller describes the capsule as "irregulariter 4–5 angulata," but Mossman's specimens are precisely like those from New Zealand and Fuegia. Bridel and Müller describe the perichætial leaves as cordate, but these appear to be not different in form from the cauline.

P. CROCEUS (*Mitten*). Habitu staturaque *P. Magellanici*, caule subsimplici foliis siccitate erectis appressis humidis e basi erecta convoluta oblongo-ovata inferne cellulis elongatis teneris pallidis superne in maculam obcordatam basin fere dimidiam occupante intense croceo tinctis inde subito in minutas depressas incrassatas pallide fuscas transeuntibus angustatis lanceolatis erecto-patentibus apice crassiusculo acutis lamellis obtectis margine superne dorsoque apice dentatis, perichætialibus basi longiore tenerioreque convolutis parte angustata breviore vaginula filis fuscis emergentibus pilosa, theca in pedunculo elongato inclinata oblonga bi-angulata plano convexo, operculo rostrato, calyptra glabra.

Hab. Brazil, common on clayey banks, *Gardner*, no. 12.

Leaves, when dry, more erect and appressed, and gradually narrowed from an ovate base in which the saffron-coloured spot appears to be uniformly present.

P. HORRIDUS (*Mitten*). Habitu formis communibus *P. formosi*, caule simplici, foliis rigidis siccitate vix mutatis e basi subovata erecta, convoluta, cellulis elongatis angustis subpellucidis subito superne in parvas depressas transeuntibus angustatis divaricatis lanceolatis apice sensim angustatis acutis lamellis obtectis marginibus e basi partis angustatæ dentatis erectis dorso apice parce subindistincte dentato, perichætialibus caulinis conformibus paululo angustioribus, theca in pedunculo elongato oblonga horizontali bi-angulata plano-convexa.

P. Magellanicum, *Hedw. Sp. Musc.* t. xx. fig. 2.

Hab. Hermite Island, Cape Horn, *Dr. J. D. Hooker*. Sandy Point, Magellan, *Lechler*, 1163. Falkland Islands, *Dr. J. D. Hooker* and *Lechler*, 97.

Young leaves glaucous green, the older and nearly the whole plants ferruginous, stiff, and scarcely at all altered by drying, gradually narrowed at the apex into a bristly point, not obtusish as in *P. Magellanicus*, nor so abruptly narrowed from the dilated base, but gradually narrowed from a base of a subovate form. Hedwig's fig. 2, *l. c.* excellently represents the leaves of this species; but the figure of the whole plant (fig. 1) is very different, and equally well depicts the species here understood as *P. Magellanicus*; and as both inhabit the same region, it may not be improbable that the original specimens were intermixed. As to the remark in 'Fl. New Zealand' that *P. giganteum* and *P. longisetum* may be forms of *P. Magellanicum*, with equal justice might all the tetragonal capsuled *Polytricha* be referred to *P. commune*.

5. POLYTRICHUM, *L.*

P. juniperinum, *Hedw.*
Hab. Tasmania, Elliott Rivulet, *Mr. Archer*; and elsewhere, *Mossman*.

P. commune, *L.*
Hab. Tasmania, Cheshunt, *Mr. Archer*.

XVIII. SPHAGNACEÆ.

1. SPHAGNUM, *Dill.*

S. cymbifolium, *Dill.*
Hab. Tasmania, *Mr. Archer*.

S. NOVO-ZELANDICUM (*Mitten*). *S. cymbifolio* simile, caule strato unico cellularum inanarium corticato foliis obovatis lingulatis apice obtusis denticulatis marginatis basi brevi-calcaratis spatiis basi paucis inanibus cæteris repletis, ramis cellulis corticalibus inanibus foliis ovatis acuminatis apice truncatis denticulatis e serie triplici cellularum marginatis spatiis latiusculis fibrillis repletis poris singulis binis trinisve involucrantibus latissime ovalibus obtusis apice denticulatis structura rameis conformibus, theca *S. cymbifolii*.
Hab. New Zealand, *Kerr* and *Knight*.

Nearly allied to *S. cymbifolium*, and with some resemblance to *S. contortum*, but its branches not so curved, its leaves of a different form, all margined, spaces wider, and pores few in number.

S. CONFERTUM (*Mitten*). Habitu *S. compacti*, ramulis dense confertis breviusculis, caule cortice e serie cellularum triplici formato serie externo fibris repleto, foliis oblongis apice rotundatis suberosulis spatiis intercellularibus superioribus fibris repletis inferioribus inanibus margine nullo, ramulis cortice cellulis inanibus foliis ovatis concavis obtusis apice truncatis denticulatis margine serie unico cellularum angustissimarum superne minutissime serrulato spatiis latiusculis fibris spiris approximatis repletis, poris singulis.
Hab. Tasmania; Western Mountains, rivulet behind Cumming's Head, *Mr. Archer*.

Appearance and habit similar to *S. subsecundum*, but the cortical cells disposed in a triple series.

S. MOLLICULUM (*Mitten*). *S. plumoso* simile, caule cortice ex strato unico cellularum efformato, foliis sub-elliptico-ovalibus basi brevissime calcaratis apice rotundatis subtruncatis minute denticulatis spatiis intercellularibus utplurimum repletis margine e serie triplici cellularum angustissimarum composito, ramulis flaccidis cortice cellulis inanibus foliis ovatis acuminatis marginibus superne incurvis apice

cucullato-concavis rotundatis argute denticulatis marginibus ut in caulinis spatiis angustis elongatis spiris repletis, poris nullis.

Hab. Tasmania; Little Bridge's-head Creek, *Mr. Archer.*

Habit intermediate between *S. acutifolium* and *S. plumosum,* but approaching more nearly to the latter.

S. ANTARCTICUM (*Mitten*). *S. cymbifolio* simile, caule cortice e stratis tribus cellularum inanium tecto, foliis oblongis apice rotundatis, margine nullo, spatiis intercellularibus latiusculis utplurimum fibris repletis, ramulis patentibus, cortice cellulis inanibus, foliis late suborbiculari-ovatis acuminatis inferne erectis superne patentibus apice truncatis denticulatis margine angusto ex unico serie cellularum composito spatiis latiusculis longitudine in folii medio latitudinem sextuplo superantibus fibris spiris approximatis repletis, poris parvis singulis-quinisve, ramulis pendulis, foliis appressis ovatis integerrimis spatiis quatuor, sex-poriferis.

S. compactum, var. *Hook. fil. et Wils. Crypt. Antarct.* p. 122.

Hab. Campbell's Island. *Dr. J. D. Hooker.*

Rather more rigid than *S. cymbifolium,* but closely resembling it in size and appearance, differing, however, in the empty cortical cells of the stems and the margined leaves of the ramuli. From *S. compactum* it differs in the triple series of the cortical cells as well as in the form of the leaves.

S. AUSTRALE (*Mitten*). *S. cymbifolio* simile, caule seriebus circiter quinis cellularum corticato, foliis brevi-oblongis obtusis margine apicis incurvo erosulo basi calcaratis immarginatis spatiis intercellularibus inanibus, ramulis copiosis patenti-recurvis, cortice cellulis inanibus, foliis imbricatis ovatis apice latiusculis obtusis margine ex uno serie cellularum angustissimarum apicem versus remote minuteque serrulato, spatiis latis longitudine in folii medio latitudinem quadruplo superantibus fibris spiris approximatis repletis, poris parvis singulis quinisve, ramulis pendulis, foliis appressis ovato-lanceolatis obtusis, spatiis majoribus, poris circiter quinis.

S. compactum var. ovatum, *Hook. fil. et Wils. Fl. Antarct.* p. 122.

Hab. The Snugg, Huon, *Mr. Oldfield*; and in Campbell's Island, *Dr. J. D. Hooker.*

Very similar to *S. cymbifolium* and to *S. antarcticum,* but in structure allied only to the latter, from which it recedes in the form of its branch leaves. *S. compactum* is immediately distinguished from these species by its cortex being composed of a single series of cells.

S. cymbifolioides, *C. Müller, Bot. Zeit.* 1851, p. 546.

Hab. Cheshunt, Tasmania, *Mr. Archer.*

The description above quoted, according to Mossman's specimens, is incorrect, for the cauline leaves have a margin of three rows of narrow cells. In this species the cortical cells are in a single stratum, and the leaves of the ramuli have the intercellular spaces with a pore between every turn of the spiral fibre.

Observations on the Growth and Time of Appearance of some of the Marine Algæ, &c. By J. Cocks, Esq., M.D., Honorary Member of the Dublin Natural History Society. Communicated by Robert Hudson, Esq., F.R.S., F.L.S.

[Read March 3rd, 1859.]

In the course of conversation, when I was favoured last autumn with a call from Dr. Hooker accompanied by Dr. Harvey, of Trinity College, Dublin, I made some remarks on the growth and time of appearance of several species of the marine Algæ, to which these gentlemen thought I ought to give publicity. I have therefore much pleasure in availing myself of the present opportunity to contribute some additional facts to the rather limited knowledge we at present possess of a branch of natural history which, for some years past, has excited an unusual degree of interest. And, upon the threshold of this paper, I will observe that whoever adventures upon this branch of natural history with a view to follow it out to its remote conclusions, must necessarily become a practical collector.

In the course of this occupation he will observe many interesting facts, connected with the varied objects to which his attention will be especially directed, and the elucidation of which will require close and philosophical consideration.

I trust I may, without presumption, lay claim to an opinion on the subject, derivable from an experience of fifteen years, during which period I have almost exclusively devoted my time and attention to its pursuit. I have not only carefully examined the vicinity of Plymouth, so rich in marine Algæ, but I have with equal attention extended my researches for several miles both to the eastward and westward of the same place.

In the year 1855 I commenced the publication of the 'Algarum Fasciculi;' and since that period my explorations of the harbour and the coasts have been continuously and carefully repeated, *over and over again*, because it became imperatively necessary that I should provide myself with at least 700 specimens, including ten different species of Algæ, every consecutive two months. In order to accomplish this, it became necessary that I should traverse and examine a large extent of the shores in the neighbourhood.

Whilst engaged in this laborious occupation, which nothing but zeal born of love for the pursuit could have enabled me to carry out at this advanced period of my life, my attention was forcibly drawn, not only to the growth, but also to the period of the reappearance of many species of marine plants; I at length discovered that in this respect a very remarkable difference exists between these and land-plants.

For instance:—dating from the period when I first became a collector, I ascertained that many of the plants which I originally found growing in certain localities did not invariably reappear under the same circumstances; that is to say, they either disappeared altogether, or remained in abeyance during the lapse of a series of seasons; whilst, in contrast, I found the same plants growing in quite a new and different locality. I observed also that there were a few species which I never found growing but in the very spots where they were originally discovered; for instance, the "*Griffithsia secundiflora*," which was first found by my friend the Rev. Mr. Hore growing near Bovisand in 1846, where I have since been in the habit of taking it myself for many succeeding years, occurs, I believe, in no other place in Great Britain. I would also remark that, although I have visited this locality at all periods throughout the year, with the exception of three of the winter months, I have never yet found a single specimen of this plant in fruit; but I am nevertheless inclined to believe that, if specimens could be taken in December, January, and February, they would be found to be in a state of fructification. The impediments are, however, very great. The place in which it grows is difficult of approach, even at the most favourable times, and then only in a boat. Whenever the wind blows from the south-west, or when the sea is rough, it is entirely unapproachable; and besides, on reaching the spot, it is invariably found growing submerged to the depth of three or four feet at the lowest spring-tides.

In the years 1844 and 1845, I was fortunate in collecting some very large and beautiful plants of *Callithamnion roseum*—not an uncommon species. Since that period I have not succeeded in taking any so fine, and for the last three years I have not been able to secure a single good specimen. It is, however, rather remarkable that in the spring of last year (1858) a curious variety of this plant, which I had never before seen, made its appearance. It was found growing in singular abundance, and in several different localities; and although I examined many hundreds of specimens, I did not succeed in finding a single one in a state of fructification. In the year 1849 I found another species belonging to the same genus, viz. a remarkably slender variety of *Callithamnion pedicellatum*, growing in luxuriant abundance near the ballast-pond at Torpoint, since which time this variety of the plant has entirely disappeared.

In the same year, the Rev. Mr. Hore and myself found several specimens of that very rare and curious plant, *Carpomitra Cabreræ*, washed up on the shores of Mount Edgecumbe. Singular to relate, an interval of sixteen years had elapsed, and not a single specimen, save these, had been taken since the solitary one that was found by Miss Ball on the south coast of Ireland; and as previously to that occurrence no other specimen had been taken, Dr. Harvey has remarked, in his 'Phycologia Britannica,' that "this interesting plant is not truly the growth of our own shores, but has been wafted hither, as other European productions sometimes are, by the influence of currents." This surmise, however, proved to be incorrect, as both Mr. Hore and myself, since our first meeting with this plant, have on various occasions found it washed up on the shore at Mount Edgecumbe, and also at Torpoint. In the autumn of the years 1856 and 1857, I succeeded in dredging some very fine specimens, growing in seven fathoms of water in Plymouth Sound.

In the month of October 1847, I picked up my first specimen of that very rare and interesting plant, *Stenogramme interrupta*, amongst rejectamenta on the shore of Bovisand, near Plymouth,—a plant which had never before been taken in Great Britain, or perhaps in Europe. In the year 1849, and at various periods since, many other specimens have been found washed up on the shore. Latterly, however, I have taken with the dredge fine specimens of this plant, all growing on stones in six or seven fathoms of water. Some years after my first discovery of the *Stenogramme*, it has been dredged by Mr. Isaac Carrol in Cork Harbour. Miss Gifford has also found specimens washed on shore near Minehead in Somersetshire; but those I have seen from that locality are much broader in the fronds than those taken at Plymouth.

Gigartina pistillata, also a rare species, had not been found in Great Britain since the year 1829, when in 1851 it was rediscovered by my friend Mr. Gilbert Sanders, of Dublin, growing at Whitsand Bay, near Plymouth. I have since, on various occasions, secured other specimens of this plant, and always in the same locality, but I do not think any of them were so fine as those which were taken by Mr. Sanders.

When out collecting with Dr. J. W. Budd, of Plymouth, in the month of June 1854, we found growing in an obscure place amongst the rocks in Firestone Bay, Plymouth, which was only approachable by a boat, a good many specimens of *Chrysymenia rosea*,—a plant which had never before been taken in Devon or Cornwall, a few only having been gathered by Mrs. Hayden and Mrs. Gattey in the year 1850 at Filey, on the Yorkshire coast. In the year following the one in which Dr. Budd and myself took our specimens, we found others growing in the same place; but afterwards they entirely disappeared from that habitat, though many other specimens have subsequently been found in several different localities, and, amongst others, growing on the mooring-buoys in the Sound.

Again, in the years 1850 and 1851 a considerable number of specimens of that rather scarce plant, *Microcladia glandulosa*, were washed up with other rejectamenta upon the beach under the Plymouth citadel. These were all growing parasitically upon the fronds of *Nitophyllum laceratum* and *Rhodymenia laciniata*. Since that time no other specimens have been taken in this neighbourhood, although the above-named plants on which they grew are still found as abundantly as ever.

A still more singular occurrence remains to be noticed, viz. that of a single specimen being found of a species for which, from the first moment I became a collector until then, I had been diligently seeking, and which had also been carefully sought for, many years previously, by Mr. Hore, without success. I allude to *Codium Bursa*, a single plant of which I discovered growing on one of the mooring-buoys in Plymouth Harbour; and although at the same time and subsequently I have examined all the buoys in the Sound as well as in the harbour, I have never found another.

How then are the irregularities in reference to the time of appearance, as well as the disappearance of the plants I have before alluded to, to be explained? We know that the fructification of the marine Algæ takes place with regularity; that is, the tetraspores when arrived at maturity burst, and the spores are liberated, which are carried by currents to places where they attach themselves to some substance, and in due time vegetate and produce perfect plants, similar to those from which they originated. Such being the case, although many of the plants enumerated in this paper have disappeared from their accustomed localities, yet it appears very strange, and difficult to explain why, they have not been found growing in other places, or washed on shore with other rejectamenta.

These observations will, in part, tend to show, as I have before remarked, that the growth and periods of the appearance and reappearance of marine plants are not so uniformly ordered as in the instance of those plants that grow upon the land. They will also compel us to admit the uncertainties that at present surround our limited knowledge of the economy and growth of the marine Algæ.

I have now to record a circumstance referring to the growth of some of the coarser species of Algæ, such as the *Laminariæ* and *Fuci*, the result of my own observation, which, if I may be allowed to hazard an opinion, may partially account for the disappearance of many of the filamentous species from their original habitats.

For the last three or four years I have observed in various places on the shore a gradual advance towards low-water mark, of the common *Fucus serratus* and *F. vesiculosus.* On the other hand, I have also observed that the *Laminariæ*, whose growth is in deep water, have been encroaching on the shore, and are now to be found in much shallower depths. The growth of these plants from two opposite positions towards one common neutral ground has had the effect of leaving very little or no intermediate space for the growth of other Algæ, as it was in this space (namely, between the tidal limits) that a great many of the filamentous Algæ, as well as many other species, were usually found growing. To my own personal knowledge these facts are comparatively new; and I am not aware that a similar eccentricity of growth has been remarked by naturalists in other portions of the English coast.

I trust, however, the knowledge of these peculiarities will stimulate the zealous algologist to watch with greater care the economy and growth of marine plants; for it is only by a studious observation of them, and an industrious exploration of their habitats, that we can hope to establish an intimate acquaintance with this very interesting branch of natural history.

In conclusion, the votaries of algology must always, by reason of the force of circumstances, be divided into two classes; for all cannot live upon the sea-coast, nor can all pay periodical visits to it. To those who can do so may be offered the privilege of contributing to the species already known, by the discovery of something that is new. They will, by this means, not only add to the gratification of those who are less happily circumstanced, but will confer upon themselves the pleasure of acquiring fresh knowledge from a new page in the great volume of Creation.

Præcursores ad Floram Indicam.—Balsamineæ. By J. D. HOOKER, M.D., F.R.S., L.S. &c. and T. THOMSON, M.D., F.R.S., L.S. &c.

[Read June 16th, 1859.]

THIS Order, as is well known, attains its maximum development in India, and it there presents a vast assemblage of forms, all but one of which strictly belong to the genus *Impatiens.*

It is often the case that when a genus is in a striking degree local, its species are to a considerable extent well marked and easily defined: such, however, is not the case with *Impatiens*; for it would be difficult to indicate another genus in the vegetable kingdom, presenting amongst its species so many and such different modifications of structure, and of which the species are so universally and so excessively prone to vary.

We commenced the study of the genus several years ago, with nearly 100 species, fully 2000 good specimens, from all parts of India, and engravings or original coloured drawings, with analyses, of upwards of fifty. On surveying these materials for the first time, we were struck no less with the prominence of the natural groups into which most of the species appeared to arrange themselves, than with the marked contrasts in the form and colour of the floral organs of many of the species; and the accessibility and apparent feasibility of these characters were so obvious, that we congratulated ourselves on the prospect of making natural and well-defined groups of the majority of the species at any rate. A little further examination of these seemingly objective groups sufficed to dispel the illusion; and after three different earnest attempts to master the genus, at intervals of several years, and with the aid of many more specimens received since we commenced the task, we have now just risen from what must be for the present the final effort, with a feeling of great dissatisfaction with the results obtained, whether as to grouping or limiting the species.

There are only two obvious and well-limited divisions of *Impatiens*:—1. The *Scapigeræ*, with tuberous perennial rhizomes (apparent roots), from which all the leaves immediately spring, and long scapes with short terminal racemes of flowers; and 2. The *Caulescentes*. Were both these divisions comprehensive, the facility of recognizing them would have materially aided the systematic study of the species; but it is not so: the acaulescent consists of five (or perhaps but three good) species, and is so singularly confined in geographical area (the western peninsular mountains and Ceylon), that practically it is of little aid in assisting either the student or the systematist.

The caulescent group presents a number of inosculating subdivisions, of which we have adopted six, founded primarily on the habit and foliation of the species. This has often obliged us to separate plants that are very closely related indeed, and even more often to refer species of more dubious affinity to one or other group in an arbitrary manner. As it is, we have chosen what we take to be the lesser evil, and only after vainly attempting to group the species better by various combinations of the following important structural peculiarities:—

1. The seeds, which are numerous or few, with the testa polished, granulate, reticulate, pustulate, or almost villous. These afford excellent characters, but often not available in herbarium specimens; and similar seeds sometimes occur in plants of very different habit and floral structure.

2. The capsules, short, broadly elliptic, acute at both ends; or narrow, terete, or club-shaped, also afford excellent characters.

3. The form of the two combined lateral petals (called by Edgeworth and by us *alæ*), which an inspection of the garden Balsam, and of the Indian species in a living state, shows to be extremely variable. In some these are long and pendulous, in others they project horizontally and laterally; the length of the posticous lobes of each ala varies extremely, and even in the same species (*I. leptoceras* and others), it may itself vary from almost undivided to manifestly three-lobed. In *I. tingens*, Edgw., one lobe is developed in æstivation within the spur.

4. The anticous petal (*vexillum*, Edgw.) may be erect or projecting, flat or arched, entire or bilobed, keeled, cristate, or even spurred down the mesial line of the back, the spur sometimes terminating in a clavate gland (*I. racemosa*, var. *polyceras*). Great variation of this dorsal appendage in one species is exemplified by many.

5. The posticous or spurred sepal, called by us *labellum* (by Edgeworth *galea*), undergoes very many modifications in the genus, from a broad slightly concave lamina (*I. scabrida, tuberculata*, &c.) to a funnel-shaped organ with a very long spur (*I. leptoceras* and many others), a cornucopia (*I. longicornu*), a blunt straight sac (*I. Walkeræ, Jerdoniæ*, &c.), or a sac with a longer or shorter spur. This sepal is the most deceptive of all as affording characters: in *I. longicornu* it varies from a mere cone to a broad deep sac with an abrupt spur; in some of the section *Oppositi-*

foliæ we suspect that it is spurred or muticous in the same species, though, in the present condition of synonymy, we have often been obliged to accept such modifications as of specific value. The spur itself may be straight or curved or spiral, ascending or descending (according to the position of the flower), attenuate or inflated, or clavate or saccate, being sometimes variable in these respects in the same species.

6. The lateral sepals may be two or four, the two posticous alone (those next the labellum) being invariably present and tolerably constant in form; the two anticous, first observed by Edgeworth, may be present or absent in the same species, and are often reduced to papillæ or glands. The apices of the sepals (as of the dorsal spur of the vexillum) are often glandular. The relative size of the sepals and petals offers too often a very fallacious character, depending primarily on conditions of flowering.

7. The form of the flower may be flat—that is, with the laminæ of the vexillum, alæ, and even of the labellum, all in the same plane; or the whole flower may be concave, from the concavity and prominence of the vexillum and labellum especially, which (as in *I. macrophylla*) may greatly exceed the alæ, and, appearing to confine these, give them a vertical direction.

8. The colour of the flower is very variable in many of the species; yellow and purple are the prevailing colours, the former passing through ochreous, &c., into a dull red, and the latter through pink, &c., into white. In many, the flowers are spotted, the yellow with various shades of red or purple, and the purple with darker spots or blotches. In *I. racemosa* and its allies, the yellow and pale purple are mixed, and we find the same species with wholly yellow and with dirty purple flowers. For extreme variation of colour in one species, we would cite *I. longicornu* and *leptoceras*; for intensity of colour, *I. janthina* and *racemulosa*.

9. The inflorescence is always lateral, though apparently terminal in the *Scapigeræ* and in some of the *Racemosæ*. The peduncle is solitary in many, fascicled and axillary in most of the *Lateriflora*. The peduncles are 1-flowered in some, 2- or many-flowered in others; solitary in some, and fascicled in others. The species with normally fascicled 1-flowered peduncles have sometimes the fascicles reduced to one peduncle; and the species with 2- or more-flowered fascicled peduncles present sometimes 1-flowered fascicled peduncles, or even solitary 1-flowered peduncles. This leads to great confusion and an inosculation of some species (or individuals) in all the groups with alternate leaves, which we have been

unable to avoid. The position of the bracts must in all cases be referred to in order to determine the real condition of the inflorescence, though not necessarily to find the place of the plant in our system; for we are obliged to place a species with two 1-flowered axillary peduncles, bracteate at the base, in a different section from another with a solitary 2-flowered peduncle, bracteate at the ramification, however closely allied they may be in every other respect. A more awkward fact still, is that both these modifications may occur in the same species, sometimes in the same specimen.

An equally perplexing combination of discordant characters is afforded by the ramification of the peduncle itself, the inflorescence being racemose, interruptedly so, whorled and corymbose, or even umbellate through the reduction of the racemose or verticillate inflorescence. Numerous examples of several of these modifications in one species, or even specimen, may be found in the groups *Subverticillatæ*, *Umbellatæ*, and *Racemosæ*.

10. The foliation may be wholly basal (radical), as in the *Scapigeræ*; wholly opposite, as in most of the *Oppositifoliæ*; wholly alternate, as in most of the *Racemosæ*; wholly (or almost) verticillate or ternate, as in *I. Griffithii* and *I. Gardneriana*; opposite below and alternate above, as in *I. amplexicaulis*, *I. latifolia*, and *I. Thomsoni*; opposite below and ternately verticillate above, as in *I. flavida*; verticillate in the middle and opposite or alternate above and below, as in *I. trilobata*, *I. salicifolia*, and sometimes in *I. latifolia*. *I. multiflora* and *I. trilobata* are very puzzling species, being sometimes opposite-leaved throughout the whole individual, at others as constantly alternate, and others having some of the leaves ternate. The base (in form—acute, rounded, or cordate) and petiolation of the leaf are extremely variable in individual species; of the former we may instance *I. repens* and *I. scapiflora*; of the latter, *I. insignis*, *I. leptoceras*, and many others.

For the most part the foliage is glabrous; it is sparsely hairy in a good many, pubescent in a few, tomentose or hirsute in still fewer, villous or glandular on the surface in none. The margin is often serrate or duplicate-serrate, with gland-tipped lobules, and is armed at the base and on the petiole with stipitate glands, which are always very variable in number, position, and form in each species. No species has stipules properly so called; but many have large glands, solitary or fascicled, sessile or stipitate, at the bases of the petioles on the stem.

11. The stems of Balsams are annual or perennial; or more often

they have perennial rhizomes and annual branches; a few are suffruticose, having woody stems and annual branches. The axis presents numerous modifications of habit, consistence, surface, and extension. Some of the largest suffruticose species (*I. Jurpia, fruticosa*, &c.) attain 5 feet in height—and perhaps much more—resembling acanthaceous bushes in their half-shrubby character and tumid nodes; the scapigerous section has been already mentioned; another equally remarkable set of species, as regards their stems, includes the succulent-jointed epiphytic peninsular species, *I. Jerdoniæ, viridiflora*, &c.

The morphology of the flower of *Impatiens* has occupied the attention of many observers, who have taken different views of the real nature of the pieces of the perianth; we coincide with the view taken by Roeper[*], Edgeworth[†], and Henfrey[‡], and which we have ourselves confirmed from numerous observations on the living species. There are three independent methods of obtaining proof of this view; and they all appear to us to give the same result: they are the following:—

1. Seeking amongst the species for those with the fullest complement of organs, and ascertaining the position and value of the supernumerary ones.—The existence of species with four lateral sepals was first indicated by Edgeworth, who has pointed out that they are figured in the plate of *I. glanduligera* (*I. Roylei*, Walp.) in Royle's 'Illustrations,' who, moreover, detected them in other species, *I. amplexicaulis*, &c., and first discerned their significance. We may add *I. longipes, urticifolia, leptoceras*, var. η, *sulcata, sabrida*, and *arguta* as also having four sepals, but not constantly.

2. Comparison with a closely allied genus which presents a different modification of perianth,—as *Hydroceras*, which at once explains *Impatiens*.

3. Examination of the relative positions, &c., of the parts in single and double flowers, with one another and with the axis—the course pursued by Mr. Henfrey.

All these methods lead to the same result, and appear to us to prove that the flower of *Impatiens* consists of a calyx of three (or more rarely five) sepals, of which the two supernumerary are always smallest and next the axis; the two next always green, and small as compared with the petals and the odd one, or that away from the axis, which is usually coloured and spurred. The corolla consists of one erect, often bifid or emarginate petal next the axis, and four others combined in pairs and irregular in form. To save verbiage and periphrasis, we have, in the descriptions, called the two small lateral sepals only the "sepals;" the spurred one we call "labellum," the petal next the axis "vexillum," and the combined lateral petals "alæ."

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[*] Linnæa, ix. 921.

[†] Linn. Trans. xx. 37.

[‡] Linn. Journ. Bot.

The geographical distribution of the Balsams is on the whole singularly circumscribed: with the exception of the very few Siberian and European species, none extend to the north or north-west much beyond Kashmir; one only is found in Affghanistan (*I. Lemanni*). The species gradually increase in number, proceeding south-eastwards from Kashmir to Khasia and the peninsula of India, in about the following proportion:—

Kashmir, Kishtwar, and countries west of Sutlej ...	10
Sutlej to Nepal frontier	13
Nepal, Sikkim, and Bhotan	25
Khasia Mountains	21
Malay peninsula	8
Western peninsula	41
Ceylon	18

Only three of the Indian species are found in other parts of the world.

The distribution of the extra-Indian species is:—

Europe and Siberia	3
North America	2
Malay Islands, Philippines, and China	8 ?
Tropical Africa and Madagascar	8 ?
Extra-tropical South Africa	1

Numerous species will yet be detected in Madagascar and tropical Africa, and probably others in Western China and Birma. With regard to the distribution of the groups, the *Scapigeræ* are wholly peninsular and Ceylonese; the *Oppositifoliæ* almost exclusively peninsular, the *Umbellatæ*, &c., chiefly so; the *Lateriflora* and *Racemosæ* chiefly Himalayan and Khasian.

Again, of these countries the western peninsula presents the most peculiar species, only one-eighth of its species being found in other countries. The Himalaya ranks next in this point of view, two-fifths of its species being found in other countries. The Khasia mountain species, on the other hand, are chiefly Himalayan, with a few peninsular, two-thirds of its species being found in other countries. One-half the Malayan species are found in the western peninsula, and two-ninths of the Ceylon.

We add a key to the species, arranged under their countries, but have little confidence in its proving a certain guide to determining them systematically,—our object in this, as with the other Præcursores, being to bring together all the available matter regarding each genus, rather than to present it in a completely elaborated systematic form*.

CONSPECTUS SECTIONUM.

A. SCAPIGERÆ. *Rhizoma* breve, perenne. *Folia* omnia radicalia. *Scapus* gracilis, apice racemifer.—(*Bracteæ* patentes pedicellis multo breviores, carnosulæ. *Pedicelli* graciles. *Sepala* latiuscula. *Labellum* saccatum v. calcaratum. *Alæ* 2–3-lobæ. *Vexillum* fornicatum. *Capsula* late elliptico-oblonga v. lanceolata. *Semina* pustulata, minima.) (Sp. 1–5.)

A perfectly natural group, and readily recognized, confined to the western peninsula and Ceylon.

B. OPPOSITIFOLIÆ. Annuæ. *Folia* omnia opposita v. in paucis alia opposita, alia ternatim verticillata. *Pedicelli* solitarii v. fasciculati, uniflores, rarissime (in *I. salicifolia*) 2-flores.—(*Sepala* angusta, labello plerisque concavo calcarato v. mutico, rarissime saccato. *Vexillum* sæpius breve. *Alæ* non caudatæ. *Capsula* brevis, medio turgida, utrinque attenuata, in *I. Kleinii* solum subcylindrica et *I. salicifolia* clavata. *Semina* magna, testa lævissima.) (Sp. 6–20.)

For the most part a very natural group. *I. salicifolia* is the chief exception, its 2-flowered states being referable to D. Many of the species are very doubtful, and the synonymy is confused, the original specimens being in many cases bad, or badly named in Herbaria. The *I. pendula* and *Mysorensis*, though alternate-leaved, should naturally come into this group; and single-flowered, opposite-leaved specimens of *leptopoda* ?, *radicans*, and others of C may be referred to it.

C. SUBVERTICILLATÆ. *Folia* omnia subopposita, v. inferiora alterna, superiora opposita v. verticillata. *Pedunculi* 1–∞ -flores. (Sp. 21–33.)

A very artificial group, divisible into those with one-, and those with two- or more-flowered peduncles. Occasional specimens of several having all the leaves opposite may be referred to B, and others with them all alternate to D, E, F, and G. There are great difficulties attending the discrimination of the allies of *I. latifolia*, *Roylei*, and *sulcata*. *I. Goughii* may be referred to *Umbellatæ* or *Lateriforæ*, or even to *Racemosæ*.

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* Whilst these pages were passing through the press, a Number of the 'Madras Journal of Science' (Sept. 1858) has been announced, containing an important paper by Lieut. Beddome on the Peninsular species, to which I shall refer at the end of this monograph.—J. D. H., Kew, Nov. 10th, 1859.

D. Uniforæ. *Folia* omnia alterna. *Pedunculi* 1-flori. (Sp. 34–47.)

Another rather artificial assemblage, of which I suspect only a few (*I. Balsamina*, *scabriuscula*) have invariably 1-flowered peduncles, and of which the others, when 2-flowered, may be referred to E. *I. leptopoda* is probably a state of *I. latifolia*. *I. capillipes* is a curious species, very unlike the others.

E. Lateriforæ. *Folia* omnia alterna, subdistantia, non omnia approximata v. subverticillata. *Pedunculi* solitarii v. fasciculati bracteolati, secus caulem elongatam plerumque axillares (non axillis supremis tantum siti), patentes, 2–6-flores. *Flores* racemosi, non umbellati. (Sp. 48–64.)

A very natural group, if confined to those species which, like *I. macrophylla*, *glandulifera*, *serrata*, *scabrida*, &c., have elongated stems and peduncles from axils of many of the rather distant leaves; but with regard to the others, several of them present specimens which fall naturally into G, and others when 1-flowered would be sought for in D. The group is divisible into several sections.

F. Umbellatæ et Capitatæ. *Folia* omnia alterna, versus apicem caulis conferta. *Flores* apices versus pedunculi elongati brevissime racemosi v. umbellati v. corymbosi.—(Bracteæ plerisque conspicuæ.) (Sp. 65–78.)

This group embraces certain closely allied peninsular species with simple stems and very short, many-flowered inflorescence, of which *I. linearis* and *umbellata* are types; but others are branched and few-flowered, as *I. grandis*, *campanulata*, &c., and may be referred to E.

G. Racemosæ. *Folia* omnia alterna. *Pedunculi* plures, elongati, multiflori, demum folio longiores. *Flores* racemosi, interdum verticillati, v. fasciculati. (Sp. 80–95.)

A very natural group on the whole, the principal exceptions being *I. longicornu* and *I. urticifolia*, some forms of which may be referred to E; *I. Walkeri* is closely allied to *I. Jerdoniæ*; *I. cornigera* to certain species in F.

CONSPECTUS SPECIERUM. (* denotat species non endemicas.)

I. MALAYANÆ.

§ B 1. *I. chinensis (no. 6). *Fol.* oppos. subsessil. *Fl.* majusculi longe calcarati.
2. *I. oppositifolia (no. 7). *Fol.* oppos. brevi-petiol. angusta. *Fl.* parvi breve calcarati.
3. I. circæoides (no. 32). *Fol.* oppos. longe petiolata. *Fl.* parvi breve calcarati.
4. I. Griffithii (no. 8). *Fol.* terna. *Fl.* majusc.
§ D 5. *I. Balsamina (no. 34). *Fol.* angusta, grosse serrata. *Fl.* longe calcarati.
6. *I. flaccida (no. 45). *Fol.* lata. *Fl.* longe calcarati.
7. I. capillipes (no. 49). *Fol.* angusta, crenata. *Fl.* brevi-calcarati.
§ F 8. I. Tavoyana (no. 79). *Fol.* petiolata, ovata. *Fl.* parvi.

II. CEYLON.

§ A 1. *I. acaulis (no. 3).
§ B 2. *I. oppositifolia (no. 7).
§ C 3. *I. latifolia, *L.* (no. 20).
§ D 4. *I. Balsamina (no. 34). Erecta. *Fol.* angust. *Fl.* longe calcarati.
5. I. repens (no. 38). Repens. *Fol.* long. pet. *Fl.* flavi brevi-calcar.
6. I. leptopoda (no. 39). Erecta. *Fol.* ampla. *Fl.* majuscul. pall. *Calc.* gracile.
7. I. truncata (no. 40). Erecta. *Fol.* membranacea. *Fl.* parvi. *Calc.* breve.
8. I. Hensloviana (no. 47). Erecta. *Fol.* ampl. pubesc. *Fl.* maximi albi. *Calc.* longiss.
9. I. macrophylla (no. 37). Erecta. *Fol.* maxima. *Fl.* medioc. fasciculati, alis exsertis. *Calc.* breve.
10. I. glandulifera (no. 36). Erecta. *Fol.* maxima. *Fl.* medioc. fasciculati, alis minimis inclusis. *Calc.* breve.
§ F 11. I. janthina (no. 66). *Fol.* 1–2. *Fl.* violacei.
12. I. linearis (no. 68). *Fol.* angust. *Fl.* pallidi. *Calc.* breviss.
13. I. appendiculata (no. 69). Simplex. *Fol.* ovato-lanc. *Fl.* pallid. *Calc.* breve.
14. I. leucantha, *Thw.* (no. 67). Simplex. *Fol.* lanceol. *Fl.* alb. *Calc.* conicum rectum.
15. I. subcordata (no. 71). Simplex. *Fol.* ovat.-lanc. *Fl.* alb. *Calc.* gracile.
16. I. Hookeriana (no. 75). Fruticosa, ramosa. *Fol.* oval. *Fl.* magni. *Calc.* magnum.
§ G 17. I. Walkeri (no. 84). *Fl.* rubri. *Labellum* longe saccatum.
18. I. elongata (no. 85). *Fl.* rubri. *Labellum* gracile, calcaratum.
19. I. cornigera (no. 86). *Fl.* flavi. *Labellum* calcari mediocri apice incurvo.

III. PENINSULÆ OCCIDENTALIS (MALABAR, &c.).

§ A 1. I. scapiflora (no. 1). *Fol.* glabra. *Calc.* mediocr. incurvum.
2. I. modesta (no. 2). *Fol.* pilosa. *Calc.* mediocr. incurvum.
3. *I. acaulis (no. 3). *Fol.* orbicul. *Calc.* gracillimum.
4. I. rivalis (no. 4). *Fol.* ovat.-oblong. *Calc.* gracillimum.
5. I. Stocksii (no. 5). *Fol.* late ovat. *Calc.* 0.
§ B 6. I. Gardneriana (no. 9). *Fol.* terna.
7. I. inconspicua (no. 14). *Fol.* opposita. *Fl.* minuti, ecalcarati.
8. I. Lawii (no. 13). *Fl.* ampli, ecalcarati.
9. *I. chinensis (no. 6). *Fol.* stipulata, subsessilia. *Fl.* magni. *Calc.* filiforme.
10. I. diversifolia (no. 12). *Fol.* exstipulata. *Fl.* mediocres. *Calc.* filiforme. *Caps.* brevis.
11. I. Kleinii (no. 15). *Fl.* minimi. *Calc.* filiforme. *Caps.* linearis.
12. I. setosa (no. 16). *Fl.* magni. *Calc.* filiforme. *Fol.* stipul. longe petiolata.
13. I. rufescens (no. 10). *Calc.* breve. *Fl.* mediocres, rubri, pubescentes.
14. I. Dalzellii (no. 18). *Calc.* breve. *Fl.* flavi, majusculi.
15. I. tenella (no. 17). *Calc.* breve. *Fl.* minimi.
16. I. tomentosa (no. 11). *Calc.* breve. *Fl.* mediocr. pubesc.
17. *I. oppositifolia (no. 7). *Calc.* breve. *Fl.* majusc. glabri. Folia stipulata.

Pedunculi 1-flores.

§ C 18. *I. latifolia (no. 20). Herbacea. *Fol.* suboppos. et verticillat. *Fl.* ampli.
19. I. lucida (no. 21). Herbacea. *Fol.* opposit. membran. *Fl.* minores.
20. I. Leschenaultii (no. 22). Robusta. *Fol.* opposita, rigida.

Pedunculi 2–6-flores.

21. I. verticillata (no. 31). Herbacea. *Fol.* verticillat. *Fl.* majusc.
22. I. Goughii (no. 33). Debilis. *Fol.* opposit. *Fl.* parvi.
§ D 23. *I. Balsamina (no. 34). Glabrata. *Fol.* angusta. *Calc.* gracile.
24. I. scabriuscula (no. 35). Puberula. *Fol.* angust. *Calc.* breviss.
25. I. pendula (no. 41). Parvula, pilosula. *Fl.* minimi. *Calc.* 0.
26. I. Mysorensis (no. 42). Parvula, glaberr. *Fl.* minim. *Calc.* breve.
27. I. Munronii (no. 43). Pubescens. *Fl.* purpurei. *Sepala* magna. *Calc.* conicum, hamatum.
28. I. dasysperma (no. 44). Glabra. *Sepala* parva. *Calc.* gracile.
29. *I. flaccida (no. 45). Glaberr. *Fl.* medioc. *Sepala* parva. *Calc.* gracillimum.
30. I. pulcherrima (no. 46). Glabra. *Fl.* maxim. *Sepala* minuta. *Calc.* longiss. gracillimum.
31. I. Hensloviana (no. 47). Suffrutic. pubescens. *Sepala* ampla. *Fl.* magni. *Calc.* gracile.

§ E 32. I. fruticosa (no. 59). Elata, fruticosa. *Fl.* ampli. *Calc.* gracile.
33. I. Jerdoniæ (no. 62). Humilis, crassa. *Sepala* parva. *Labell.* longe saccatum.
34. I. auriculata (no. 63). Humilis, crassa. *Sepala* maxima. *Labell.* longe saccatum.
35. I. viridiflora (no. 64). Humilis, crassa. *Sepala* parva. *Labell.* conicum, calare incurvo.
§ F 36. I. umbellata (no. 70). Simplex. *Fol.* subverticill., brevi-petiol. *Calc.* gracile.
37. I. uncinata (no. 72). Simplex. *Fol.* longe petiol. *Calc.* breve, incurvum.
38. I. viscida (no. 73). Ramosa. *Fol.* longe petiol. *Pedunc.* viscid. *Calc.* gracile.
39. I. grandis (no. 76). Robusta. *Bract.* magn. *Fl.* maxim. *Calc.* elongat. gracile.
40. I. campanulata (no. 77). Fruticosa. *Bract.* magn. *Fl.* margin. *Calc.* perbreve, incurvum.
§ G 41. I. maculata (no. 83).

IV. MONT. KHASIA, SILHET, &c.

§ B 1. *I. chinensis (no. 6). Simplex. *Fol.* opposita, brevi-petiol. *Calc.* gracile.
2. I. salicifolia (no. 19). Ramosa. *Fol.* opposit. et tern. brevi-petiol. *Calc.* breve.
§ C 3. *I. multiflora (no. 23). Elata, ramosa. *Fol.* opp. tern. et alt. longe petiol. *Pedunc.* 1-flori.
4. I. radicans (no. 24). Humilis, simplex. *Fol.* opp. brevi-petiol. *Pedunc.* 1–3-flori. *Labell.* saccat. *Calc.* breve.
5. *I. trilobata (no. 25). Elata, ramosa. *Fol.* opp. tern. et alt. *Pedunc.* solitar. 2–5-flori.
6. I. flavida (no. 26). Elata, ramosa. *Fol.* opp. et tern., longe petiol. *Fl.* flavi. *Pedunc.* solit., 2–4-flor. *Labell.* saccat. *Calc.* tumidum.
§ D 7. *I. Balsamina (no. 34).
§ E 8. *I. arguta (no. 52). *Fol.* longe acuminat. *Bract.* subulatæ, tortæ. *Calc.* breviusc.
9. *I. discolor (no. 53). *Fol.* ovato-acuminat. *Bract.* late ovatæ. *Calc.* breve, incurvum.
10. I. porrecta (no. 54). *Fol.* acuta. *Bract.* setaceæ. *Sep.* parva. *Calc.* attenuatum, incurvum.
11. I. bella (no. 55). *Fol.* acuta. *Bract.* setaceæ. *Sep.* parva. *Calc.* gracile, tortum, puberulum.
12. I. racemulosa (no. 56). *Fol.* acuminat. *Fl.* 6–8 intense violac. *Sep.* majuscul. *Calc.* breve, incurvum.
13. *I. latiflora (no. 57). *Fol.* acuminat. *Fl.* ampl. *Sep.* ampla. *Calc.* rectiusculum, elongatum.

14. *I. pulchra (no. 58). Humilis. *Fl.* ampli. *Sep.* magna. *Calc.* conicum, incurvum.

15. *I. Jurpia (no. 60). Fruticosa. *Fl.* ampli. *Sep.* parva. *Labell.* ventricosum. *Calc.* robusto incurvo.

§ F 16. I. bracteata (no. 65). *Bract.* pectinato-crinitæ.

17. *I. acuminata (no. 74). Humilis, simplex. *Calc.* elongatum.

18. *I. lævigata (no. 78). Fruticosa. *Labell.* ventricosum. *Calc.* breve.

§ G 19. *I racemosa (no. 80). *Ped.* verticillati.

20. *I. tingens (no. 88). *Ped.* alterni. *Calc.* breviusculum.

21. *I. leptoceras (no. 91). *Ped.* alterni. *Calc.* elongatum.

V. Mont. Himalaya.

§ C 1. *I. multiflora (no. 23). Elata. *Fol.* opp. alt. et tern. *Pedunc.* 1-flores.

2. *I. trilobata (no. 25). Elata. *Fol.* opp. alt. et tern. *Pedunc.* 2–5-flores.

3. I. Roylei (no. 27). Elata, caule tereti. *Bract.* ovato-lanceol. *Pedicell.* umbell. *Capsula* brevis, clavata.

4. I. Thomsoni (no. 28). Elata, caule tereti, lævi. *Bract.* subulatæ. *Calc.* conicum.

5. I. amplexicaulis (no. 30). Elata, caule 4-gono. *Fol.* supern. altern. amplexicaulia. *Capsula* linearis.

6. I. sulcata (no. 29). Elata, caule tereti sulcato. *Capsula* nutans, linearis.

§ D 7. *I. Balsamina (no. 34). *Fol.* longe lanceolata. *Calc.* rectum v. curvum.

8. I. spirifer (no. 48). *Fol.* ovato-lanceol. *Calc.* breviusculum spiraliter involutum.

§ E 9. I. serrata (no. 50). Gracilis, glabra. *Bract.* subulat. rectæ. *Sep.* parva. *Calc.* gracile, abrupte incurvum.

10. I. scabrida (no. 51). Robusta, pubescens. *Bract.* subulat. rectæ. *Sep.* ampla. *Labell.* conicum. *Calc.* incurvum.

11. *I. arguta (no. 52). Gracilis, glabra. *Bract.* subulat. tortæ. *Sep.* majuscula. *Labell.* infundib. *Calc.* incurvum.

12. *I. discolor (no. 53). Erecta, subramosa. *Bract.* late ovatæ. *Sep.* parva. *Calc.* apice involutum.

13. *I. latiflora (no. 57). Humilis, robusta. *Bract.* lanceolat. *Sep.* ampla. *Calc.* gracile, elongatum.

14. *I. pulchra (no. 58). Humilis, gracilis. *Flor.* ampli. *Bract.* lanceolat. *Sep.* ampla. *Calc.* conicum, incurvum.

15. *I. Jurpia (no. 60). Fruticosa. *Fl.* magni. *Sep.* parva. *Labell.* ventricosum.

16. I. puberula (no. 61). Pubescens. *Fl.* mediocr. violac. *Sep.* majusc. *Calc.* gracile, incurvum.

§ F 17. *I. lævigata (no. 78). Fruticosa. *Fl.* magni. *Bract.* et *Sep.* amplæ.

a. *Pedicelli verticillati.*

§ G 18. *I. racemosa (no. 80). *Fl.* parvi flavi.

19. I. bicornuta (no. 81). *Fl.* majusc. lilacini. *Labell.* inflatum.

20. I. longicornu (no. 82). *Fl.* majusc. *Labell.* conicum v. saccatum.

b. *Pedicelli alterni.*

21. I. insignis (no. 87). *Fol.* angusta. *Sep.* ampla. *Fl.* rosei. *Calc.* elongatum, gracile.

22. *I. tingens (no. 88). *Fl.* parvi, flavi. *Calc.* breviusculum.

23. I. longipes (no. 89). *Pedicelli* gracillimi, patentes. *Fl.* medioc. flavi. *Sep.* parva. *Labell.* conicum. *Calc.* hamatum.

24. I. urticifolia (no. 90). *Fl.* majusc. lilacini. *Bract.* caducæ. *Sep.* ovata. *Labell.* saccatum. *Calc.* breve, incurvum.

25. *I. leptoceras (no. 91). *Fl.* inter minores, flavi. *Sep.* ovata. *Labell.* infundibulif. *Calc.* gracile.

26. I. laxiflora (no. 92). *Fol.* longe petiol. ovat. *Fl.* majusc. *Sep.* parva. *Labell.* infundibulif. *Calc.* gracile.

27. I. glauca (no. 94). *Fol.* subtus glauca.

28. I. tuberculata (no. 95). *Fl.* mediocres v. parvi, lilacini. *Labell.* gibbum, ecalcaratum. *Capsula* clavata, tuberculata.

29. I. brachycentra (no. 96). *Fl.* parvi, flavi. *Labell.* conicum, ecalcaratum.

30. I. Lemanni (no. 93). *Fol.* longe petiolata, obtuse sinuato-dentata. *Fl.* rosei.

I. Impatiens, *L.*

A. Scapigeræ (see p. 112).

1. I. scapiflora (*Heyne in Roxb. Fl. Ind. Ed. Wall.* ii. 464; *Wall. Cat.* 4758!). Glaberrima, foliis reniformi v. orbiculari-cordatis, bracteis late ovatis obtusis, sepalis oblique late ovatis, calcare flore breviore incurvo clavato obtuso, vexillo brevi cucullato latiore quam longo, alis 3-lobis.—*Wight*, p. 967, non *Hook. Bot. Mag.* t. 3587.

I. scapiflora, *Wight & Arn. Prodr.* 137 in part.; *Paxt. Mag. Bot.* v. p. 101 *cum ic.*

Hab. Montibus Malabar! *Heyne, Wight, &c.* (fl. Jun.–Octob.).

Herba pedalis. *Folia* 2–3″ lata, integerrima v. remote denticulata, nervis radiantibus. *Flores* $\frac{1}{2}$–$\frac{2}{3}$″ lati. *Capsula* oblongo-lanceolata.

2. I. modesta (*Wight in Madr. Journ. of Science*, v. p. 13, et *Icones*, t. 968). Foliis ovato-cordatis acutis crenato-serratis supra pilosis subtus glaucis, bracteis ovatis apice subulatis, sepalis ovato-oblongis parvis, calcare flore breviore obtuso, alis 3-lobis. An var. *I. scapifloræ*?

Hab. Mont. Malabar! *Wight* (fl. Jul.–Aug.).

Ab *I. scapiflora* differt foliis supra pilosis ovatis acutis, floribus minoribus, bracteis apice subulatis, sepalis minoribus et calcare breviore.

3. I. ACAULIS (*Arn. in Hook. Comp. Bot. Mag.* i. 325). Glabra, foliis orbiculatis oblongisve basi rotundatis cordatisve, bracteis ovatis acutis, pedicellis elongatis, sepalis parvis ovatis obtusis, calcare gracillimo elongato, alis 2-lobis?—*Thwaites, En. Pl. Ceylon.* 68.

I. scapiflora, *Hook. Bot. Mag.* t. 3587; *Wight, Ic. Descript.* t. 967; et *Wight & Arn. Prodr.* quoad varietat. calcare interdum elongato.—I. bulbosa, *Moon. Cat.*?

β. Foliis profunde cordatis grosse crenatis.

Hab. Mont. Ceyloniæ! *Moon, Walker,* &c., et Malabariæ! *Nimmo, Lobb,* &c., var. β, Concan?, *Herb. Stocks.*

Variat insigniter statura; 2–12″ alta, et floribus ⅓″ ad 1½″ latis.—*Vexillum* breve, galeatum, latius quam longum, retusum.

Thwaites (*En. Plant. Ceylon,* 68) suspects that this cannot be Heyne's plant, because that is described by Wallich as having the spur several inches in length; but in some of our specimens it is 2½–3 inches in length.

4. I. RIVALIS (*Wight in Madr. Journ. Science,* v. p. 13, t. viii. et *Icones,* t. 751). Foliis oblongis ellipticis ovato-oblongisve basi obliquis superne pilosis glabratisve, bracteis ovatis subacutis, sepalis late ovatis obtusis, calcare gracillimo elongato, alis 3-lobis.—An var. *I. acaulis*?

Hab. Mont. Malabariæ! et Concan! *Wight, Dalzell, &c.* (fl. July, August).

Statura variabilis 2–12″ alt. *Folia* serrata v. integerrima, basi attenuata, obtusa v. subcordata. *Flores* ½–1½″ lati, vexillo fornicato brevi. *Semina* hispida.

In the dried state it is impossible to distinguish this from *I. acaulis,* of which I suspect it is a variety, as does Thwaites.

5. I. STOCKSII (*H. f. & T.*). Parvula, glaberrima, foliis late ovatis, membranaceis, bracteis ovatis acutis, sepalis late ovatis obtusis, labello basi saccato (calcare nullo), alis 3-lobis.

Hab. Mont. Peninsulæ (prov. Canara! et Maisor?), *Herb. Stocks. et Law.*

Herba parvula, 2–4″, tenerrima. *Petioli* graciles, foliis subæquilongi. *Folia* pollicaria, obscure crenato-dentata. *Flores* 6–8, sub ⅔″ lati. *Sepala* vexillo orbiculato, subæquilonga. *Labellum* ovatum, concavum.

B. OPPOSITIFOLIÆ (vide p. 112).

6. I. CHINENSIS (*Linn. Sp. Pl.*). Glabra, caule erecto, angulato, foliis setaceo-stipulatis subsessilibus linearibus acutis remote serratis subtus glaucis, pedicellis solitariis fasciculatisve, sepalis linearibus, calcare gracili elongato incurvo, vexillo orbiculari acuminato, alis semi-obovatis basi auriculatis.

I. fasciculata, *Lamk. Enc. Méth.* i. 359, var. *a*; *Wight, Ic.* 748 et *Madr. Journ. Sc.* v. p. 14; *W. & Arn. Prodr.* 138; *Hook. Bot. Mag.* 4631.—I. heterophylla, *Wall. in Roxb. Fl. Ind.* ii. 458, *Cat.* 4748!—Balsamina fasciculata, *D.C. Prodr.* i. 686.—I. setacea, *Coleb. in Hook. Ex. Flor.* ii. 137; *Miq. Plant. Hoh.* 1139.

Var. *β*. Foliis late oblongis obovatisve.

Hab. Mont. utriusque Peninsulæ a Concan! ad Travancore! alt. 5–8000 ped., *Wight, &c.*, Birma! *Wallich*! Malacca, *Griffith*! montibus Khasiæ alt. 3000–5000 ped.! *de Silva*, &c. (fl. May–August). (v. v.)

Dist. Hong-Kong! *Hance.*

Planta valde variabilis. *Caules* simplices v. ramosi, basi repentes ad nodos setas stipulæformes crassas 2 v. plures gerentes v. omnino nudi. *Folia* plerumque basi cordata, 2–4″, subcoriacea, superne glaberrima v. hispidula. *Pedicelli* patentes; flores læte rosei v. albi, interdum purpureo-variegati, 1–2″ lati, locis humidioribus umbrosisve depauperati. *Capsula* elliptico-oblonga, utrinque attenuata, vix ½″. *Semina* orbicularia, atra, lævia, opaca v. subnitida.

In *Bot. Mag.* this plant is erroneously supposed to be a native of Ceylon and the whole Himalayan range. Its broad-leaved form is certainly the *I. chinensis*, L., as I have ascertained from the Linnæan Herbarium.

7. I. OPPOSITIFOLIA (*Linn. Sp. Pl.*). Flaccida, ramis gracilibus, foliis glanduloso-stipulatis linearibus oblongo-linearibusve integris serratisve, pedicellis solitariis fasciculatisque, sepalis linearibus, vexillo late ovato v. orbiculato acuminato, labello conico calcare brevi recto v. incurvo.—*Wight & Arn. Prodr.* 139; *Wight*, no. 883.

I. ros-marinifolia, *Retz. Obs.* v. 29; *D.C. Prodr.* i. 686; *Wight, Ic.* 750, *in Madras Journ. Sc.* v. p. 14, t. ix.—I. Mysorensis, *Wall. Cat.* 4743 A!

Hab. Mont. tropicis Malabar! Ceylon! et penins. Malay.! frequens (fl. Aug.–Nov.).

Caulis 4–10″ simplex v. ramosus. *Folia* insigniter varia, membranacea, sessilia v. breve petiolata. *Flores* ½–¾″ lati, albi v. pallide rosei. *Labellum* valde varians, calcare brevi. *Capsula* acuminato-rostrata, 2–6 sperma. *Semina* oblonga, paulo compressa, atro-brunnea, subnitida, funiculo substrophiolato.

Thwaites, *En. Pl. Ceylon* (*errata*) remarks that Mr. Ferguson, having examined Hermann's plant, considers the *I. rosmarinifolia* of Retz to be the true Linnean *I. oppositifolia*, and the fact is, that the two plants are one and the same. It is extremely common, and so variable, that no descriptions, plates, and specimens altogether agree: hence the confusion. *I. oppositifolia* of Wight and Arnott, as described from Wallich and Heyne's specimens, has the narrow capsule of *I. Kleinii*, with a short conical, nearly straight spur, but in Heyne's, Wallich's, and Wight's specimens, the ripe capsule is broadly elliptical, and the spur often incurved.

8. I. GRIFFITHII (*H. f. & T.*). Erecta, foliis superioribus ternis petiolatis anguste lanceolatis acuminatis marginibus remote serrulatis basi setosis subtus glaucis, pedicellis solitariis, sepalis ovato-oblongis acu-

minatis, calcare filiformi elongato, vexillo amplo obcordato dorso rostellato, alis late bilobis.

Hab. Peninsula Malayana; Monte Ophir! et Gerai! prope Malacca, alt. 3000 ped.! *Griffith, Lobb, Cumming.*

Species pulcherrima foliis ternis facile distinguenda, sparse puberula præcipue ad nodos petiolosque. *Folia* 2–3″ superne puberula. *Pedicelli* graciles. *Flores* 1″ diametr., rosei? *Calcar* pedicello longius.

9. I. GARDNERIANA (*Wight, Icones,* 1050). Glabra, caule basi repente radicante dein erecto, foliis oppositis et ternatim verticillatis ovato-lanceolatis acuminatis argute serratis basi ciliatis, pedicellis solitariis gracilibus, sepalis oblongis longe acuminatis, labello cymbiformi calcare gracili elongato, vexillo dorso alato acuminato, alis bipartitis segmentis retusis horizontaliter patentibus.

Hab. Mont. tropicis Malabariæ locis udosis apertis infra Sispara! *Wight* (fl. Jan., Feb.).

Herba spithamæa et altior. *Folia* 1–2″, supra sparse pilosula. *Pedicelli* suberecti, 2–3″. *Flores* sub $\frac{3}{4}$″ lati. *Capsula* oblonga. *Semina* glabra.

I. Griffithii simillima; sed differt foliis ovatis, vexillo late obcordato, floribusque majoribus.

10. I. RUFESCENS (*Benth. in Wall. Cat.* 4747!). Foliis sessilibus oblongis ovato v. obovato-oblongis acutis serratis supra scaberulis subtus pallidis nervis rufo-tomentosis, pedicellis subsolitariis floribusque pubescentibus, sepalis lineari-lanceolatis setaceo-acuminatis, labello saccato calcare nullo, vexillo late oblongo acuminato, alis breviusculis bilobis lobo superiore auriculæformi.—*Wight & Arn. Prodr.* 138, *Icones,* t. 969. (An var. *I. tomentosæ*?)

Hab. Mont. tropicis Malabariæ! et Maisor! *Wight, &c.*

Caules 6–12″, superne sæpius tomentosi. *Folia* subcoriacea, *I. fasciculatæ* textura subsimilia. *Flores* $\frac{1}{3}$–$\frac{3}{4}$″ lati, rosei? *Capsula* $\frac{1}{2}$″, rostrato-acuminata. *Semina* ut in *I. oppositifolia.*

11. I. TOMENTOSA (*Heyne in Wall. Cat.* 4751! an *Wight*?). Foliis breve petiolatis oblongo-lanceolatis acutis serratis supra hispidulis, pedicellis solitariis binisve floribusque pubescentibus, sepalis lineari-lanceolatis acuminatis, labello sublonge saccato calcare brevi abrupte terminato, vexillo late oblongo acuminato, alis bilobis.

I. reticulata, *Wall. Cat.* 4750! *Wight & Arn. Prodr.* 139, ? *Wight,* p. 749 (var. *glabrata*).—I. ramosissima, *Dalzell in Hook. Kew Journ. Bot.* 1851, iii. 230.

Hab. Mont. Malabariæ! et Maisor! *Heyne, Wight, &c.*; Pegu! *Wallich* (ex *Exempl. manca*) (fl. Aug., Sept.).

Proxime affinis ut videtur *I. rufescenti* (ejus varietas?) a qua differt præcipue si non solum, labello breviter calcarato.

12. I. DIVERSIFOLIA (*Wall. Cat.* 4749!). Diffusa, foliis lineari- v. ovato-oblongis glaberrimis, basi subcordatis argute serratis, pedicellis soli-

tariis fasciculatisve, sepalis linearibus acuminatis, calcare filiformi elongato, vexillo parvo, alis late semiobovatis.—Descript. ex *Wight & Arn. Prodr.* 139.

I. heterophylla, *Wall. Cat.* 4748 *b.*—I. Arnottiana, *Miquel, Plant. Hoh.* 275.

Hab. Mont. temperatis Malabariæ! et Canaræ! *Klein, Wight, &c.* (fl. Oct.).

Species parvula, 4–6″, caulibus longe radicantibus. *Folia* ¾–1½″. *Flores* sub ½″ lati. *Stigmata* (fid. *W. & A.*) distincta.

13. I. Lawii (*H. f. & T.*). Caulibus erectis ramosis foliisque subtus glaberrimis, foliis breviter oblongis basi obtusis sessilibus superioribus sensim minoribus cordato ½-amplexicaulibus remote serratis supra scaberulis, pedicellis breviusculis, floribus magnis, sepalis linearibus falcatis, vexillo orbiculari apice rostellato, labello parvo ecalcarato late concavo, alis maximis lobis lateralibus parvis.

Hab. Canara! et Malabar! *Law.*

Species pulcherrima, habitu ramoso *I. diversifoliæ,* qua differt floribus magnis, labello ecalcarato, foliis brevioribus superioribus sensim minoribus pedicellisque brevioribus.—*Caules* pedales. *Folia* ½–1″ longa, subacuta, subtus pallida. *Pedicelli* plerumque folio breviores linea puberula instructi, fructiferi deflexi. *Flores* ¾″ lati, pulchre violacei? *Capsulæ* immaturæ lanceolatæ vix ½″ long.

A very beautiful species or form allied to *I. inconspicua* and *diversifolia,* but very different in stature and the size of the flower; it is much branched, and the leaves are smaller upwards.

14. I. inconspicua (*Benth. in Wall. Cat.* 4741!). Parvula, ramosa, diffusa, glaberrima, foliis proteis anguste oblongis linearibus lanceolatisve serratis obtusis acutis acuminatisve, pedicellis puberulis, floribus minutis, sepalis lineari-subulatis, labello naviculari acuminato basi subsaccato ecalcarato, vexillo ovato acuminato, alis bilobis lobo superiore minore inferiore obovato.—*Wight & Arn. Prodr.* 139; *Wight,* p. 970.

I. pusilla, *Heyne in Wall. Cat.* 4745, fid. *W. & Arn.* non *Herb. Hook.*—An I. filiformis, *Wight & Arn. Prodr.* 140? an I. Mysorensis, *Roth. Wall. Cat.* 4743 in part.?

Hab. Mont. temperatis Malabariæ! *Heyne, Wight, Foulkes, &c.*; et Concan? *Stocks, &c.* (fl. Nov.).

Planta valde inconspicua et variabilis. *Folia* in exemplare cl. Wallichii (no. 4741 in *Hook. Herb.*) anguste linearia, basi cordata, 2-pollicaria; in cæteris et in Icone Wightii breviora oblonga lanceolata. *Flores* pallidi, ¼–½″ lati.—Exemplar *I. pusillæ,* Heyne, Wall. Cat. 4745 in Herb. Hook. diversa est species, calcare instructa.

15. I. Kleinii (*Wight & Arn. Prodr.* 140). Erecta, glabra, diffuse ramosa, foliis longe v. breve petiolatis membranaceis basi biglandulosis obovatis ovatis lanceolatisve acutis subserratis superne glabris v. pilosulis subtus glaucis, sepalis lineari-subulatis, labello ovato-acuminato

convexiusculo calcare elongato gracili, vexillo brevi glabro v. pilosulo orbiculato acuminato, alis longe unguiculatis late obovatis vix lobatis, capsula gracili.—*Wight. Ic.* 884; *Arn. in Hook. Comp. Bot. Mag.* ii. 325.

Balsamina minor, *D. C. Prodr.* i. 686.

Hab. Mont. Malabar! Canara! and Concan! *Heyne, &c.*

The very long slender spur best distinguishes this species from its small-flowered, opposite-leaved allies, except *I. diversifolia*, which has sessile leaves, and the following.

16. I. SETOSA (*H. f. & T.*). Herbacea, ramosa, ramis oppositis, foliis petiolatis setoso-stipulatis ovato-lanceolatis acuminatis obscure serratis margine basin versus distanter longe setosis utrinque pilosulis, pedicellis gracilibus, sepalis majusculis oblique ovatis, calcare elongato filiformi gracillimo incurvo.

Hab. Mont. Malabar! *Herb. Wight.*

Herba 2-pedalis. *Folia* 1½–2½″, submembranacea, subtus glauca, basin versus limbi et petioli pilis longis patulis flaccidis ciliata et stipulata. *Pedunculi* 1″ et ultra. *Flores* violaceo-purpurei, ⅔″ lati; calcare gracillimo, 1–1½″.

The long hairs towards the base of the leaves, at the margin, and at the position of the stipules, together with the rather large purple flower, and very long slender ascending spur, distinguish this from all others of the opposite-leaved 1-flowered section. I have seen but one specimen in Wight's Herbarium.

17. I. TENELLA (*Heyne in Wall. Cat.* 4746 A!). Parvula, erecta, subflaccida, foliis breve petiolatis lineari-oblongis lanceolatisve serratis subtus pallidis, floribus parvis glabris, sepalis linearibus acuminatis, labello naviculari v. conice saccato in calcar breve rectum v. incurvum attenuato, galea brevi, alis longe unguiculatis vix lobatis semi-obovatis falcatis.—An *I. Kleinii* var. parviflora?

I. pusilla, *Heyne, Wall. Cat.* 4745 in *Herb. Hook.*—I. tenuicula, *Steud.*

Hab. Mont. Malbariæ tropicis! *Heyne, Lobb, Jacquemont,* no. 1501.

Herba flaccida, ramosa, 3–6 pollicaris; ramis gracilibus. *Folia* varia, 1–2½ pollicaria, petiolata v. subsessilia. *Flores* parvi, sub ⅓″ lati, purpurei? *Capsula* tumidior quam in *I. Kleinii. Pedicelli* fructiferi horizontales (fid. *W. & Arn.*), erecti et deflexi in exempl. *Lobb.* lecto.

18. I. DALZELLII (*H. f. & T.*). Glaberrima, ramosa, foliis (2–3″) omnibus breve petiolatis ovato- v. oblongo-lanceolatis basi cordatis acuminatis spinuloso-serrulatis supra puberulis subtus pallidis, floribus mediocribus flavis, sepalis majusculis lineari-lanceolatis acuminatis, labello saccato calcare brevi curvo terminato, vexillo late cucullato dorso alato.

Hab. Mont. tropicis Concan! *Dalzell, Hb. Stocks* (fl. Aug.).

Caules crassi, 8–14 pollicares. *Folia* ½–1¾″ utrinque glabra v. superne puberula. *Pedicelli* solitarii v. pauci, glaberrimi. *Flores* glaberrimi, flavi (fid. *Dalzell*), sub ½″ lati. *Capsula* ½ unc. longa, medio turgida, utrinque breviter attenuata. *Semina* 3–4, magna, oblonga, testa tenuiter crustacea, atra, nitida.—Habitus et folia fere *I. oppositifolii*; sed flores et capsulæ majores. *Capsulæ I. fasciculatæ* sed seminibus paucis, magnis, oblongis, subsplendentibus.

19. I. SALICIFOLIA (*H. f. & T.*). Erecta, robusta, pubescens v. tomentosa, foliis (3–4″) oppositis verticillatisque stipulatis breve petiolatis lanceolatis acuminatis setuloso-serratis, pedicellis fasciculatis brevibus, floribus pubescentibus glabratisve, sepalis parvis lanceolato-subulatis, labello magno longe saccato basi calcare brevi uncinato terminato, vexillo obovato dorso carinato et cornuto, capsula clavata glaberrima.

Hab. Mont. Khasia tropicis, alt. 3000–4000 ped.! *Lobb, &c.* (fl. Aug.–Oct.). (v.v.)

Caules 2–3 pedales, oppositi, ramosi. *Folia* 3¼″, submembranacea, serraturis simplicibus v. 1-setulosis, plerumque basin versus foliorum setulosis. *Stipulæ* e fasciculis setarum carnosis ad basin petiolorum, interdum 0. *Pedicelli* graciles, pollicares, interdum pedunculo communi brevissimo fasciculati. *Flores* speciosi, 1″ lati, purpurei. *Calcar* longitudine variabile.

C. SUBVERTICILLATÆ (vide p. 112).

a. Pedunculi uniflores (in *I. multiflora* interdum 2–3 flores).

20. I. LATIFOLIA (*Linn. Sp. Pl.*). Glaberrima, foliis suboppositis subverticillatisque 2–4″ longe petiolatis lanceolatis v. ovato-lanceolatis acuminatis margine crenato-serratis setulosisque, floribus amplis sepalis parvis ovato-cuspidatis, labello acuminato concavo calcare elongato gracili recto v. incurvo, vexillo obcuneato cornuto, alis bilobis, seminibus reticulatis.—*Wight, Ic.* t. 741.

I. cuspidata, *Wight et Arnott in Hook. Comp. Bot. Mag.* ii 321.

Var. β *bipartita*, foliis omnibus alternis longioribus, *Thw. En.* 65.—I. bipartita, *Arn. in Comp. Bot. Mag.* i. 322.—I. floribunda, *Wight in Madr. Journ. Sc.* v. p. 7.

Hab. Mont. tropicis Malabariæ!; Nilgherries! et Ceylon! *Wight, Lobb, &c.*; Concan v. Canara! *Law, &c.*; var. β sylvis subtropicis Ceyloniæ alt. 5000–6000 ped.! *Walker, &c.* (fl. Oct.).

I. Leschenaultii et *I. lucidæ* valde affinis (an illarum forma luxurians?). A priore differt foliis sæpius subverticillatis, longius petiolatis, majoribus, flaccidioribus, vexillo majore.—*Folia* subtus secus nervos sparse pubescentia. *Flores* 1″ lati, calcare gracili plus minusve incurvo apice inflato, emarginato v. bifido. *Capsula I. Leschenaultii* et *latifoliæ* sed seminibus (fid. *Wt.*) reticulatis.

According to Wight, this differs from *I. Leschenaultii* in the form of the flower, long straight spur, and reticulated seed, but all my specimens have incurved spurs (as in *I. Leschenaultii*), the seeds in all seem to have a spongy testa which is rugose when dry, and the difference in the form of the detals is not so strong in my specimens as in Wight's figure. *I.*

Leschenaultii is probably a more robust, smaller leaved and flowered state of this plant. Thwaites (*Enum.* p. 65), who unites *bipartita*, Arn., with *cuspidata*, remarks that the anterior lobe of the petal varies a good deal. I have a specimen marked *I. cuspidata*, W. & A., by Gardner, and gathered by himself on the Nilgherries, in which the capsule is $\frac{2}{3}''$ long, and the leaves, almost all alternate, have long soft spines at the base and on the petiole.

I have no doubt of this being Linnæus's *I. latifolia*, having examined the plant so named in the Linnean Herbarium; it consists of only the top of the stem, with the upper alternate leaves and one very large flower, with a curved spur that is forked at the tip for a long way up. There is no authority for the specimen in Linnæus's Herbarium, but *I. bifida* is written on the paper; so this is probably the original *I. bifida*, Thunb., described by Thunberg as having a bifid spur, and erroneously supposed to have been a native of the Cape of Good Hope, where it has never since been found.

21. I. LUCIDA (*Heyne in Wall. Cat.* 4738!). Glabra, ramosa, foliis (2–4″) longe petiolatis membranaceis inferioribus alternis, vel aliis oppositis aliis alternis lanceolatis ovato-lanceolatisve acuminatis crenatis basi setosis, pedicellis subsolitariis, sepalis parvis ovatis acuminatis, labello concavo calcare elongato gracili, vexillo obovato, alis bilobis, lobis obovatis.—An. var. *I. latifolia*, L., floribus minoribus?

I. latifolia, *Wt. & Arn. Prodr.* 138; *Wall. Cat.* 4737! non *Linn.*

Hab. Mont. tropicis Malabariæ! *Heyne, Wight, Gardner.*

Herba 1–2′, caule basi crassiusculo. *Petioli* $\frac{1}{2}$–1″, graciles. *Folia* subnitida, utrinque angustata, flaccida. *Flores* pro planta parvi, $\frac{1}{2}$–$\frac{2}{3}''$ lati, albi v. pallide rosei (*Wight*). *Capsula* $\frac{1}{2}$ unc. longa, elliptica, turgida, utrinque attenuata, glabra v. pilosa. *Semina* sub 4, magna, oblonga, compressa, opaca, grosse reticulata.

Wight and Arnott remark that this differs from *I. Leschenaultii* in the densely pubescent capsules, but I find that to be a very inconstant character.

22. I. LESCHENAULTII (*D.C. Prodr.* i. 686; *Wall. Cat.* 4739). Suffruticosa, glaberrima, ramosissima, foliis 1–1$\frac{1}{2}$ pollicaribus plerisque oppositis petiolatis lanceolatis v. ovato-lanceolatis acuminatis serratis, pedicellis solitariis v. binis, sepalis parvis ovato-subulatis, labello saccato acuminato calcare elongato gracili curvo, vexillo late obovato rostellato, alis bilobis lobis obovatis.—*Wight & Arn. Prodr.* 136.

An var. I. latifoliæ, *L.*?; *Wight*, p. 970 bis.

Hab. Mont. Ceyloniæ, *Leschenault* (fid. *D.C.*) et Malabariæ! frequens, *Wight, &c.* (fl. tot. ann.).

Suffrutex 8-pedalis, ramosus, foliosus, caulibus ramisque suboppositis crassiusculis. *Folia* subcoriacea, petiolo $\frac{1}{4}$–$\frac{1}{3}''$ longo. *Flores* fere 1″ diametr., pallide rosei v. albi. *Capsulæ* et semina *I. latifoliæ* simillima sed minora.—Potius varietas *I. latifoliæ*, rigidior, densior, foliis minoribus, brevius petiolatis, magis serratis.

23. I. MULTIFLORA (*Wall. Cat.* 4742!). Elata, ramosa, foliis 3–5″ oppositis ternis v. alternis stipulatis longe petiolatis membranaceis ovato-lanceolatis utrinque acuminatis crenato-serratis et basin versus setulosis utrinque sparse puberulis v. glaberrimis, pedicellis gracilibus breviusculis rarius in pedunculum brevem fasciculatis, floribus purpureis, sepalis parvis subulatis falcatis, labello saccato sacco basi obtuso calcare brevi v. elongato uncinato terminato, vexillo obovato galeato dorso cornuto, alis parvis.

Exemplar foliis omnibus oppositis pedicellis fasciculatis vix basi unitis.—*Wall. Cat.* 4742!

Exemplar foliis oppositis et ternis=*tripetala*, Roxb., Wall. Cat., *I. ternifolia*, *Hb. Ham.* 4752 B!

Hab. Himalaya orientali tropica; Sikkim, alt. 2000–5000 ped.! Mont. Khasia alt. 0–3000 ped.! *Lobb, &c.* (fl. Aug.–Oct.). (v.v.)

Planta variabilis, affinis *I. trilobatæ,* sed flores solitarii vel si bini pedunculo communi brevissimo inserti. Ab sectione discrepat foliis interdum omnibus alternis, pedicellisque interdum in pedunculum brevem fasciculatis.

Caulis 2–4 pedalis, laxe ramosus, glaberrimus v. uti folia superne puberulus. *Stipulæ* e fasciculis setarum. *Folia* cum petiolo interdum spithamæa. *Pedicelli* pro planta breves, vix unciales. *Flores* $\frac{1}{3}$–1″ lati, longiores quam lati, læte purpurei v. violacei, calcare brevi v. elongato, $\frac{1}{3}$–$\frac{2}{3}$″. *Capsula* $\frac{1}{2}$–$\frac{2}{3}$″ pollicaris, angusto-elliptica, utrinque attenuata. *Semina* 6–8, oblonga, compressa, opaca, rugulosa.

b. *Pedunculi* 2-multiflores (vide *I. multiflora* in § C, *I. bracteata* et *I. janthina* in § F).

24. I. RADICANS (*Benth. in Wall. Cat.* 4763). Glaberrima v. pubescens, caule simpliciusculo stricto robusto folioso, foliis stipulatis (2–4″) breve petiolatis anguste lineari- v. oblongo-lanceolatis basi rotundatis acutis subserratis utrinque pubescentibus (raro glabris), pedunculis 1–3-floris, pedicellis gracilibus, floribus magnis, sepalis minimis, labello longe saccato basi calcare brevi uncinato terminato, vexillo galeato dorso gibboso subcornuto, alis parvis.

Hab. Mont. Khasia paludibus temperatis alt. 4000–6000 ped.! *Mack, Griffith, &c.* (fl. Jul.–Sept.). (v.v.)

Species formosa, habitu foliisque fere *I. fasciculatæ,* tota pubescenti-pilosa v. rarius glaberrima.—*Caules* 6–10″, stricti, robusti, rarius ramosi. *Stipulæ* e fasciculis setarum. *Folia* subcoriacea, subtus pallida. *Pedunculi* pollicares, apice bracteolis lanceolatis tot quot pedicellis muniti. *Flores* speciosi, violaceo-purpurei. *Labellum* saccatum, sæpe $\frac{2}{3}$″ longum et $\frac{1}{2}$″ latum. *Capsula* $\frac{3}{4}$″, glaberrima, medio turgida, utrinque attenuata. *Semina* oblonga, compressa, testa pallida subrugosa membranacea.

25. I. TRILOBATA (*Coleb. in Hook. Exot. Flor.* ii. t. 141). Elata, ramosa, glabra, foliis (2–4″) oppositis alternis subverticillatisque stipu-

latis petiolatis supremis sessilibus ovatis v. ovato-lanceolatis acuminatis crenato-serratis sæpissime ciliolatisque membranaceis, pedunculis solitariis gracilibus elongatis 2–5-floris, pedicellis gracilibus, floribus amplis glaberrimis, sepalis minimis subsetaceis, labello longe saccato sacco conico abrupte v. sensim in calcar incurvum breve v. elongatum angustato, vexillo galeato late obcordato dorso cornuto, alis parvis bilobis.—*Wall. Cat.* 4762 A, et 4763 e Pundua, *Wall. Hb.*

Hab. Himalaya orientali tropica; Sikkim, alt. 2000–4000 ped.! *J. D. H.*; Mont. Khasia subtropicis frequentissime, alt. 3000–5000 ped.! (fl. Jul.–Oct.). (v.v.)

Planta variabilis, 3–4′, pulcherrima, ramosa, *I. multifloræ* affinis, sed differt pedunculis 2–5-floris, gracilibus, elongatis.—*Caules* v. rami graciles, elongati, pluries divisi. *Folia* vel omnia opposita, vel inferiora tantum opposita superiora alterna rarius terna v. verticillata, interdum cum petiolo spithamæa, textura, forma, stipulatione &c. omnino ut in *I. multiflora*. *Pedunculi* 1–3 pollicares, apice bracteolis setaceis tot quot pedicellis minuti. *Pedicelli* ½–1″, graciles. *Flores* speciosi, violacei. *Labellum* ½–⅔ pollicare. *Capsula* et semina ut in *I. multiflora.*

26. I. FLAVIDA (*H. f. & T.*). Caule gracili erecto, foliis (1½–2″) oppositis ternisque longe petiolatis ovato-lanceolatis utrinque angustatis glaberrimis multinerviis subserratis, pedunculis axillaribus solitariis petiolo longioribus erectis 2–4-floris, floribus flavis subumbellatis, bracteis recurvis, sepalis parvis ovatis oblongisve acuminatis, labello saccato subcampanulato v. ventricoso calcare hamato terminato, vexillo dorso gibbo.—An *Wall. Cat.* 4763 A (sub *trilobata*)?

I. fruticosa, *Lesch, Wall. Cat.* 4762 (*sphalm.*).—Impatiens e Pundua fl. flavo, *Wall. Herb. in Linn. Soc.* sine numero.

Hab. Sylvis tropicis Bengaliæ orientalis, Silhet! *Wallich*; Luckipore in Silchar! *J. D. H. & T. T.* (fl. Nov.). (v.v.)

Herba 2–3-pedalis, glaberrima. *Folia* inferiora opposita, superiora sæpius terna. *Pedunculi* sæpe oppositi, stricti, 1–2″; pedicellis ½–1″. *Flores* 1½″; sepalis viridibus, labello flavo; alis flavidis apices versus purpurascentibus. *Capsula* ¾″, sublanceolata, rostrata.

Some of Wallich's specimens of this in Herbs. Hooker, Lindley, and Henslow, have the ticket of *I. fruticosa* (e Nilgherry) attached to them; other specimens are, I think, catalogued under *I. trilobata* (4763 A).

27. I. ROYLEI (*Walpers, Repert.* i. 475). Elata, robusta, ramosa, glaberrima, foliis (2–4″) petiolatis stipulatis oppositis verticillatisque rarius alternis ovato- v. oblongo-lanceolatis lineari-oblongisve grosse serratis basi glanduloso-setigeris, pedunculis versus apices ramulorum elongatis erectis robustis multifloris, pedicellis subumbellatis breviusculis, sepalis majusculis late oblique ovatis acuminatis, labello longe saccato ventricoso lato basi obtuso rarius conico in calcar breve abrupte angustato, vexillo bilobo, alis amplis, capsula clavata.

I. glandulifera, *Royle, Ill.* 157. t. 28. f. 2, *Lindl. Bot. Reg.* 1840, t. 22; *Hook. Bot. Mag.* 4020.

Var. *a.* Foliis crenato-serratis glanduliferis.

Var. *β, moschata.* Foliis subverticillatis alternisque, grosse serratis minus glandulosis.—*I. moschata,* Edgw. in Linn. Trans. xx. 38.

Var. *γ, candida.* Foliis supremis oppositis verticillatisque, floribus albis roseo maculatis.—*I. candida,* Lindl. in Bot. Reg. n. s. xiii. Misc. 85. n. 204.

Var. *δ, macrochila.* Foliis supremis alternis, petalorum lateralium lobis posticis elongatis.—*I. macrochila,* Lindl. Bot. Reg. 18, t. 8.

Hab. In Himalaya temperata occidentali frequentissima, a Nepal?, *Wallich*; ad Marri! alt. 6000–8000 ped., *Fleming* (fl. Jul.–Sept.). (v.v.)

Species insignis, gigantea, 4–10-pedalis, ramosa, caulibus basi crassitie pollicis, fistulosis?. *Folia* valde varia, longe v. brevius petiolata, basi rotundata v. angustata, grosse serrata; caule ad basin petioli glandulis crassis pedicellatis aucto. *Pedunculi* robusti, stricti, erecti, 2–5″, bracteis ovato-lanceolatis acuminatis. *Sepala* lateralia 2–4¼″, viridia, subpersistentia. *Flores* læte rubro-purpurei, ⅔–1¼ unc. lati; calcare brevi incurvo. *Capsula* ½–⅔″, clavata. *Semina* edulia, magna, late obovoidea, testa opaca subrugosa.

This fine species approaches very closely indeed to some states of *I. longicornu,* Wall., *I. sulcata,* Wall. (*gigantea,* Edgw.), *I. Thomsoni,* and other allied species or varieties of Section H, but may always be known by the shortly clavate capsule. This short clavate capsule is indeed the only character by which many dried specimens can be distinguished from *I. longicornu* and others of that section.

The *I. moschata* of Edgeworth may be a different species, as Mr. Edgeworth suggests, but I cannot distinguish it by herbarium specimens. It is said to differ from *I. Roylei* in its musky odour, in its habit, and in the leaves being more deeply serrate; the latter appears to be a very variable character, the upper leaves being more deeply cut than the lower in both forms.

28. I. Thomsoni (*H. f.*). Herbacea, glaberrima, foliis infimis oppositis superioribus alternis verticillatisque ovato-acuminatis petiolatis glanduloso-stipulatis grosse duplicato-serratis, pedunculis aggregatis elongatis erectis pedicellatis subumbellatis racemosisve, bracteolis subulato-lanceolatis, floribus ½–¾″ long. sordide lilacinis maculatis, sepalis parvis ovato-lanceolatis, labello conice saccato in calcar breve rectum attenuato, capsulis inclinatis ¾″ long. lineari clavatis.

Hab. Himalaya temperata subalpina, Sikkim, alt. 12,000 ped.! *J. D. H.*; Kumaon et Garwhal, 12,000! *St. & W.* (6, 7, 8); Piti! et Kunawur, 9000–10,000 ped.! *T. T.* (fl. temp. pluv.). (v.v.)

Herba robusta, pedalis et ultra, *I. sulcatæ* var. *β* simillima, sed omnibus partibus minor, calcare breviore recto conico, sepalis angustioribus capsulisque brevioribus.

This puzzling plant occurs throughout the Himalaya, on the edge of the Tibetan climate, and in subalpine districts. It differs from *I.*

tuberculata in the longer spur and even capsules, from small states of *I. Roylei* in the small size, narrower capsules, subulate bracts and conical spur; from *I. longicornu* and its allies by the capsules being shorter, and forming an angle with the pedicel.

29. I. SULCATA (*Wall. Cat.* 4764). Caulibus erectis crassis sulcatis, foliis inflorescentia et floribus fere *I. Roylei,* sed capsula nutante elongata subæquali et angustiore.

I. gigantea, *Edgw.*! *in Linn. Trans.* xx. 38.

β, *minor.* Sepalo postico conico in calcar rectum sensim attenuato.

Hab. Himalaya temperata tota, alt. 7000–12,000 ped., Sikkim! *J. H.*; Nepal! *Wallich*; Kumaon! *Strachey & Wint.*; Simla! *T. T., &c.*; Kunawur! *Grant*; Marri! *Fleming* (fl. temp pluv.) (v.v.); β, Kunawur! *Grant, T. T.*

Herba gigantea; in Himalaya occidentali altit. 15 ped. et caule 5-poll. diamet. *fid. Edgeworth* attingit!—in Sikkim 5-7 pedalis.—*Caulis* fistulosus.

A very tall, coarse-growing species with furrowed stems, in the dried state so like *I. Roylei,* that it is impossible to distinguish them, except by the long capsule of this. My Sikkim specimens have often four lateral sepals. This appears to pass by numerous insensible gradations into *I. longicornu* and others. *I. Thomsoni* may be only a serrate state of it, connected by the var. β *minor* of *I. sulcata.* The inclined shorter capsules, which form an angle with the pedicel, best distinguish this from *longicornu,* &c. The seeds are large and eatable, as in *I. Roylei.*

30. I. AMPLEXICAULIS (*Edgew. Linn. Trans.* xx. 37). Glaberrima, ramosa, foliis (2–4″) inferioribus oppositis sessilibus oblongo-lanceolatis acuminatis crenato-serratis superioribus alternis amplexicaulibus ovato-lanceolatis, pedunculis axillaribus multifloris, sepalis ovatis acutis, labello late saccato calcare brevi, vexillo orbiculari bilobo, alis bilobis, capsula lineari.

Hab. Himalaya occidentali temperata, Kumaon, alt. 12,000 ped.! *Str. & Wint.*; Simla, 6000–8000 ped.! *Comta. Dalhousie,* &c.; Kulu! *Edgeworth* (fl. Sept.–Oct.) (v.v.)

Affinis *I. Roylei,* sed facile distinguenda foliis breve petiolatis basi latis superioribus basi profunde cordato-amplexicaulibus, pedunculis brevioribus, floribus paucioribus et minoribus non confertis et capsula angusta non clavata.—*Caulis* 3–4 pedalis, 4-angularis, *Edgw.*

31. I. VERTICILLATA (*Wight in Madr. Journ. Sc.* v. p. 15). Glaberrima, foliis oppositis verticillatisque (rarissime alternis) breve petiolatis lanceolatis utrinque acuminatis argute serratis serraturis infimis setigeris stipulis subulatis, pedunculis elongatis erectis subumbellatim 3–5-floris, pedicellis gracilibus, sepalis majusculis oblongo-lanceolatis, vexillo concavo breviter cornuto, labello cymbiformi calcare elongato gracillimo.

Hab. Mont. Malabar ad Shevagerry et Bolimputa! *Wight*; Cochin! *Johnstone* (fl. Aug.–Nov.).

Spithamæa ad 2-pedalem. *Caules* crassiusculi, simplices v. ramosi, ad nodos incrassati. *Stipulæ* porrectæ, spiniformes. *Folia* 2–4″ long. ⅓–½″ lat., subcarnosula, subtus pallida. *Pedunculi* stricti, foliis breviores v. longiores, interdum validi et 3″ long. *Bracteæ* parvæ, subulatæ v. late ovatæ. *Pedicelli* ½–1″, suberecti. *Flores* majusculi, ¼–¾″ diam.; calcare ¾–1″ long. recto v. lente curvo. *Capsula* immatura breviuscula, glabra.

32. I. circæoides (*Wall. Cat.* 4772). Parvula, simplex, glabra, foliis paucis oppositis gracile petiolatis ovatis acutis subserratis basin versus ciliatis subtus glaucis, pedunculis solitariis gracilibus apices versus racemum brevem gerentibus, floribus parvis, sepalis orbiculatis acuminatis, vexillo parvo concavo, labello parvo concavo breviter conice calcarato, alis (pro flore) maximis.

Hab. Tavoy! *Wallich*; Pegu! *McLelland.*

Caulis simplex, spithamæus, gracilis. *Folia* 2″, petiolo gracili, membranacea. *Pedunculi* axillares, 1–1½″. *Bracteæ* parvæ, late ovatæ, concavæ. *Pedicelli* ½″. *Flores* albi? *Sepala* viridia. *Alarum* lobus dependens ⅓″ long., labello et vexillo multoties major. *Capsula* brevis?

Nearly allied to *I. Tavoyana*, Benth., but the spur is very short, and the leaves are mostly opposite.

33. I. Goughii (*Wight, Ill.* i. 160; *Icones*, t. 1603). Pusilla, caule debili gracili laxe ramoso, foliis plerumque oppositis pollicaribus petiolatis elliptico v. oblongo-ovatis obtusis grosse crenatis, pedunculis gracilibus foliis longioribus apice subumbellatim 4–6-floris, pedicellis capillaceis, bracteis caducis, floribus minimis, calcare flore æquilongo, capsulis ellipticis utrinque acuminatis.

Hab. Mont. Malabariæ prope Pycarrah! *Gough*; Maisor! *Lobb.*

Caulis 6–18″. *Folia* interdum omnia alterna, pallide viridia, basi cuneata, in petiolum non angustata. *Flores* rosei v. albi. *Vexillum* obcordatum acuminatum; labello cymbiformi, calcare brevi recto; alis bilobis, lobis retusis. *Capsula* ⅙ unc. longa, oligosperma. *Semina* minima.

Wight remarks that this is a slender, diffuse-growing species, seeking support of adjacent plants, and then attaining 18 inches in length. The flowers are shortly racemose or subumbellate.

D. Unifloræ (vide p. 113).

Vide *I. Leschenaultii, latifolia* (*β bipartita*) in § C.—In *I. spirifera* flores rarissime bini in eodem pedicello. Vide *I. puberula, arguta,* et aliæ in F.

34. I. Balsamina (*Linn. Sp. Pl.*). Glabrata v. pubescens, caule simpliciusculo, v. ramoso, foliis petiolatis anguste lanceolatis utrinque

acuminatis grosse serratis, petiolo glandulifero, sepalis minutis late ovatis, labello pubescenti cymbiformi calcare tenui elongato, vexillo alisque amplis roseis, capsula brevi dense tomentosa.

I. coccinea, *Sims, Bot. Mag.* 1256.—I. cornuta, *Linn. Sp. Pl.* 1328.—I. longifolia, *Wight in Wall. Cat.* 4734.—I. arcuata, *Wall. Cat.* 4735! Balsamina Hortensis, *D.C.*, &c.

α, vulgaris. Elata, foliis late lanceolatis, floribus magnis, calcare breviusculo.

β, longifolia, Wt. & Arn. Prodr. i. 136. Foliis anguste lanceolatis, floribus mediocribus, calcare elongato gracili.

γ, arcuata. Diffuse ramosa, foliis parvis anguste lanceolatis, floribus parvis, calcare elongato.

δ, macrantha. Humilis, 4-pollicaris, foliis ovato-lanceolatis, floribus magnis, calcare brevi.

ε, micrantha. Humilis, caule simplici, foliis parvis ovato-lanceolatis, floribus parvis, calcare gracili elongato.

ζ, rosea. Caule simpliciusculo elongato, foliis lineari-lanceolatis, floribus inter minores, calcare brevi incurvo.—I. rosea, *Lindl. Bot. Reg. Misc.* 1841, p. 6. no. 22, et vol. xxvii. t. 27.

Hab. Var *α* et *β* per totam Indiam tropicam locis humidis a Ceylon! et Malacca! ad Punjab! frequens; var. *γ*, *δ*, *ε* in Malabar! Kurg! &c. (fl. Aug.). (v.v.)

Dist. Ins. Malayanæ! et China!

Planta vulgatissima, valde protea. Omnes varietates variant foliis floribusque glabratis pubescenti-tomentosisve.

35. I. SCABRIUSCULA (*Heyne in Roxb. Flor. Ind.* ed. *Wall.* ii. 464). Humilis, erecta, ramosa, pubescenti-tomentosa, foliis ½–1″ paucis breve petiolatis lanceolatis acuminatis serratis, pedicellis brevibus, sepalis minimis, labello cymbiformi tomentoso, calcare 0.—*Wall. Cat.* 4729!; *Arn. in Hook. Comp. Bot. Mag.* ii. 322.

Hab. Mont. tropicis Malabariæ! *Heyne, Hb. Stocks.*

Dist. China (fid. Wt. & Arn.).

I. Balsaminæ proxima sed multo minor, foliis latioribus labelloque ecalcarato.

36. I. GLANDULIFERA (*Arn. in Hook. Comp. Bot. Mag.* ii. 322). Suffruticosa, glabra, ramis crassis apices versus foliosis, foliis maximis (6–10″) longe petiolatis amplis ovatis utrinque acuminatis setuloso-serrulatis, petiolo glanduligero, pedicellis numerosis axillaribus fasciculatis, sepalis minimis subulatis, labello piloso longe saccato sacco late conico calcare brevi incurvo apice incrassato, vexillo piloso late orbiculato bilobo dorso rostrato, alis exsertis bipartitis lobo laterali brevi rotundato terminali late semiobovato pendulo.

I. cornigera, *Hook. Bot. Mag.* 4623, non *Arn.*

Hab. Sylvis tropicis Ceyloniæ! *Walker,* &c.

Species insignis, *I. macrophyllæ* habitu foliisque simillima, sed plerumque glabra. *Flores* pallide roseo-purpurei, sacco stramineo.

37. I. MACROPHYLLA (*Gardner in Herb. Hook.* and *Bot. Mag.* 4662). Suffruticosa, glabra, ramis crassis apices versus foliosis, foliis *I. glanduliferæ* sed sæpissime pubescenti-pilosis, pedicellis brevibus fasciculatis, floribus glaberrimis, sepalis minimis, labello acuminato breviter saccato calcare brevi minimo, vexillo oblongo dorso alato apice acuminato rostrato, alis minimis bipartitis inclusis.

I. glandulifera, var.?, *Arn. in Comp. Bot. Mag.* ii. 323.

Hab. Sylvis montosis subtropicis Ceyloniæ, alt. 5000–7000 ped.! *Walker*, &c.

Frutex 10–12 pedalis (fid. Walker), foliis interdum 16″. *I. glanduliferæ* affinis, sed differt floribus multo minoribus, glaberrimis, labello aurantiaco, vexillo angusto apice rostrato coccineo, alis minimis inclusis.

38. I. REPENS (*Moon Cat.*). Glaberrima, caulibus prostratis basi repentibus vage diffuse ramosis, foliis longe petiolatis ovato cordatis v. reniformi-rotundatis acutis, pedicellis foliis multo longioribus ebracteolatis, sepalis parvis oblongo-lanceolatis, labello late saccato subconico calcare brevi incurvo, vexillo latiore quam longo suborbiculato dorso corniculato, alis alte bilobis lobis brevibus latis.—*Wight, Ill.* 160. t. 61; *Hook. Bot. Mag.* 74. t. 4404.

Hab. Sylvis montosis tropicis Ceyloniæ, alt. 4000 ped.! *Walker*, &c.

Caules crassi, carnosi, hic illic radicantes. *Folia* ½-1″ lata, petiolo breviora, interdum obscure subserrata. *Pedicelli* solitarii, pollicares. *Flores* aurei, speciosi, 1″ longi; labello et vexillo pubescente. *Ovarium* hirsutum.

39. I. LEPTOPODA (*Arn. in Hook. Comp. Bot. Mag.* ii. 321). Erecta, ramosa, glaberrima, caulibus gracilibus, foliis longe petiolatis (1–3″) lanceolatis ovato-lanceolatisve acuminatis crebre crenato-serratis petioloque interdum glanduloso setosis, pedicellis ebracteolatis axillaribus subsolitariis gracilibus strictis, floribus parvis, sepalis parvis oblongo-lanceolatis, labello cymbiformi calcare gracili elongato (v. abbreviato), vexillo obcordato dorso cornuto, alis horizontaliter patentibus (? *I. latifolia*, Wall. Cat. 4737, in Herb. Henslow.). An var. *I. latifoliæ*, L.?

Var. β, *brevicornu*. Calcare abbreviato flore breviore.—I. brevicornu, *Arn. l. c.*

Var. γ, *gibbosa*. Sepalo postico cymbiformi subsaccato calcare nullo.—*Arn. l. c.*

Hab. Sylvis montosis subtropicis Ceyloniæ! alt. 5000-8000 ped., *Walker* &c. (fl. Sept.–Nov.).

Herba 1–3-pedalis. *Caules* basi interdum suffruticulosi. *Folia* submembranacea, basi attenuata, in var. *brevicornu* interdum 4-pollicaria. *Flores* $\frac{1}{3}$–$\frac{1}{2}$″ lati, latiores quam longi, ob petala lateralia horizontaliter patentia. *Capsula* $\frac{1}{3}$″, glabra v. puberula.

Thwaites describes this as being very common and variable, and points out its close affinity with *I. Leschenaultii*, in all my specimens of which the leaves are more or less opposite.

40. I. TRUNCATA (*Thw. En.* p. 66). Debilis, subramosa, caulibus superne foliis floribusque sparse puberulis glabratisve, foliis (1–1½″) petiolatis ovatis ovato-lanceolatisve acuminatis setuloso-serratis membranaceis, petiolo sparse glanduloso, pedicellis 1–3 bracteolatis gracilibus, floribus parvis, sepalis minutis subulatis, labello saccato sacco conico, calcare breve cylindrico truncato, alis inæqualiter bilobis.

Hab. In sylvis subtropicis Ceyloniæ alt. 4000–6000 ped! *G. Thomson*, *Thwaites* (fl. Oct.).

Affinis *I. leptopodæ*, sed humilior et ut videtur habitu diversa, foliis junioribus petiolis pedunculisque hispidulis, floribusque pubescenti-pilosis.

Thwaites compares this with Wight's figure of *I. inconspicua*, Bth., which, however, differs much in the opposite leaves, form of the spurless flowers, and longer, more slender pedicels.

41. I. PENDULA (*Heyne in Wall. Cat.* 4744!). Erecta, ramosa, ramis linea pubescenti cum petiolis continua, foliis (¼–½″) breve petiolatis ellipticis subcordatis v. ovato-ellipticis acutis remote serratis puberulis, pedicellis ebracteolatis solitariis pilosis fructiferis deflexis, floribus minutis glabris, sepalis labello concavo non calcarato, vexillo cornuto, capsula parva ventricosa.—*Wight & Arn. Prodr.* 137 (descr. secus *Wt. & Arn. Prodr.*).

Hab. Malabar vel Maisor, *Heyne.*

Affinis *I. scabriusculæ* fid. cl. Wt. & Arn. sed differt floribus minutis glabris.

42. I. MYSORENSIS (*Roth. Nov. Sp.* 164). Caule simplici gracili erecto, foliis alternis lanceolatis, utrinque acuminatis glabris, pedicellis binis axillaribus filiformibus folio ½ brevioribus, floribus parvis, calcare recto brevi, capsula dense pubescente.—*Roth. Nov. Sp.* 164; *Wall. Cat* 4743; *Wight, Cat.* 979 (descript. ex *Wight & Arn.* p. 137).

Hab. Maisor, *Heyne*, *Wight.*

Of this species I know nothing, except from the specimens in the Linnean Society, and the description of Wight and Arnott rendered above. It would appear to be very near *I. pendula*, but differs in the spurred flowers and pubescent capsules.

43. I. MUNRONII (*Wight, l. c.* 1049). Erecta ramosa tota pubescenti-pilosa, caule lignoso, foliis (1–2″) versus apices ramorum longe petiolatis ovatis ovato-lanceolatisve utrinque acuminatis subserratis, pedicellis ebracteolatis solitariis, sepalis hirsutis magnis late ovatis lanceolatisve acuminatis, labello in calcar conicum hamatum sensim attenuato, vexillo orbiculari dorso alato, alis brevibus obovatis bifidis.

Hab. Mont. tropicis Malabariæ, sylvis ad Sisparah! *Wight*, *Gardner*, &c. (fl. Jan.).

Suffruticulus pedalis, ramis patentibus, siccis cicatricibus ad basin foliorum delapsorum nodulosis. *Folia* utrinque pubescenti-pilosa. *Pedicelli* unciales. *Flores* pollicares, purpurei. *Ovarium* pilosum

44. I. DASYSPERMA (*Wight in Madr. Journ. Sc.* v. p. 7. f. 2, *Ic.* 742). Herbacea caule simpliciusculo, foliis (2–4″) longe petiolatis ovato-lanceolatis utrinque acuminatis crenato-serratis supra pilosis subtus glaberrimis, pedicellis ebracteolatis subsolitariis, floribus inter minores, sepalis minutis ovatis acuminatis, labello cymbiformi calcare gracili incurvo, vexillo obcordato, alis profunde bifidis horizontaliter patentibus, capsula glaberrima, seminibus pilosis.

Hab. Mont. tropicis Malabariæ sylvis prope Courtallam, *Wight* (fl. Aug., Sept.).

Glaberrima 1–2 pedalis, flaccida; ramis suboppositis. *Folia* petiolata, petiolo et basi folii interdum glandulis paucis stipitatis ornato, 2–3″ longa. *Pedicelli* pollicares, graciles. *Flores* sub ½″ lati. *Calcar* gracile interdum pilosum. *Capsula* oblique turgida, rostrata.

45. I. FLACCIDA (*Arn. in Hook. Comp. Bot. Mag.* 322). Herbacea, glaberrima, laxe ramosa, foliis (2–4″) petiolatis ovatis ovato v. elliptico-lanceolatis crenulatis basin versus setoso-glandulosis utrinque acuminatis, pedicellis ebracteolatis solitariis binisve elongatis erectis, flore majusculo, sepalis minutis linearibus, labelli limbo parvo calcare gracillimo elongato, vexillo obcordato, alis bipartitis horizontaliter patentibus.

I. latifoliæ, *L.*, var.? an I. latifolia, *Wall. Cat.* 4737 A? et I. lucida, 4738 in *Herb. Henslow.*

β. Foliis capsulaque pilosulis.

Hab. Mont. tropicis Ceyloniæ alt. 4000–6000 ped.! *Walker*, &c.; Malabariæ! *Gardner*, &c. (fl. Oct.–Dec.). (v.v.)

Var. β. Peninsula Malayana ad Moulmein! *Lobb.*

Herbacea 1–2 pedalis, tota glaberrima, nisi var. β. *Folia* plerumque ampla, membranacea, petiolo setoso v. glanduloso v. nudo, *Pedicelli* graciles, 1–2″. *Flores* magnitudine varii, ¾–1½″ lati, purpurei, violacei v. rosei, speciosi; alis profunde bilobis, lobis obovato-cordatis in var. β apice bilobis. *Capsula* 2⅓ pollicaris, turgida, utrinque attenuate rostrata, polysperma. *Semina* pilosula.

46. I. PULCHERRIMA (*Dalzell in Hook. Journ. Bot.* 1850, vol. ii. 37). Glabra, caule herbaceo simpliciusculo, foliis (3–5″) longiuscule petiolatis membranaceis ovato-lanceolatis utrinque acuminatis supra pilosulis basin versus et petiolo setoso-glandulosis, pedicellis ebracteolatis 2–3-nis erectis, floribus maximis, sepalis minutis subulatis, labelli limbo parvo subcymbiforme in calcar elongatum gracile attenuato, vexillo orbiculari bifido dorso rostrato, alis amplis bipartitis lobis obovatis apice bilobis.—*Hook. Bot. Mag.* 4615.

Hab. Mont. Concan tropicis! *Dalzell* (fl. Aug.).

Species nobilis, *I. flaccidæ* affinis, sed omnibus partibus duplo major. *Flores* 2–2½″ longi, pallide purpurei. *Pedicelli fructiferi* erecti. *Capsula* glaberrima, cernua; semina pauca, opaca, subrugosa v. tuberculata, glabra.

47. I. **Hensloviana** (*Arn. in Hook. Comp. Bot. Mag.* ii. 322). Caule suffruticoso crasso noduloso, foliis hirsutis pubescentibus glabratisve lanceolatis ovato-lanceolatisque utrinque acuminatis serratis basi v. petiolo glanduloso, pedicellis ebracteolatis subsolitariis elongatis erectis, floribus magnis, sepalis amplis late ovatis acuminate mucronatis, labelli limbo parvo calcare elongato gracili incurvo, vexillo obcuneato v. orbiculari bilobo, alis horizontaliter patentibus bipartitis segmentis obovatis bilobis.

I. albida, *Wight, Ic.* 743, *et in Madr. Journ. Science*, v. p. 7. f. 1.

Hab. Mont. tropicis Ceyloniæ! alt. 4000–6000 ped., *Walker, &c.*, et Malabariæ, alt. 2000–3000 ped.! *Wight* (fl. Sept.–Oct.).

Species pulcherrima, sæpissime tota pubescenti-pilosa, sed interdum glabrata v. imo glaberrima, ob caules crassos, pedicellos elongatos, flores magnos et sepala lateralia ampla facile dignoscenda. *Capsula* glaberrima v. pilosa.

48. I. **spirifer** (*H. f. & T.*). Glaberrima v. pilosula, foliis longe petiolatis ovato-lanceolatis caudato-acuminatis grosse crenatis in petiolum angustatis supremis subverticillatis sessilibus basi glandulis stipulatis, pedicellis subterminalibus erectis solitariis v. rarius binis basi carinatis, floribus 1½ poll. purpureis fauce flavis sepalis amplis oblique ovato-cordatis cuspidatis, labello saccato subcampanulato in calcar breviusculum spiraliter tortum sensim angustato, capsula lineari-lanceolata.

Hab. Sylvis temperatis subtropicisque Himalayæ orientalis Sikkim, alt. 4000–7000 ped.! *J. D. H.* (fl. Oct.–Dec.). (v.v.)

Species insignis, 2–4-pedalis, inter hanc sectionem et § E media, ob pedicellos cum binis basi connatos. *Folia* 1–3″, interdum puberula. *Pedicelli* pollicares. *Labellum* pallide roseum, rubro-lineatum. *Vexillum* orbiculatum, apiculatum, dorso cornutum; alarum segmentis late purpureis, posticis lineari-oblongis pendulis. *Capsula* pollicaris. *Semina* parva, orbicularia, puberula.

A very beautiful species, readily distinguished by the large flowers, short, spirally-incurved spur, long, deeply-conical, posticous sepal, and long capsules. It is very closely allied to *I. arguta*, H. f. & T., but differs in the almost invariably solitary flowers, and in the absence of the curious twisted bracteoles.

49. I. **capillipes** (*H. f. & T.*). Parvula, diffuse ramosa, glaberrima, caule gracillimo, foliis 1–2″ petiolatis lineari-lanceolatis lanceolatisve grosse crenatis nitidis flaccidis eglandulosis, pedicellis solitariis v. binis capillaribus 1-floris, floribus minutis, sepalis falcatis, labello saccato sacco ventricoso cylindraceo calcare minimo incurvo, vexillo lineari oblongo elongato, alarum lobis acuminatis.

Hab. Peninsula Malayana ad Moulmein! *Lobb.*

Species valde singularis ob folia hyalina angusta, flaccida grosse crenata, pedicellos capillares, flores minutos vexillumque elongatum. *Caules*

4–6″. *Petioli* gracillimi ½–1 pollicares. *Pedicelli* petiolos subæquantes. *Flores* albi? ⅓″ lati. *Capsula* late elliptica, basi angustata, apice acuminata, similis *I. racemuliferæ*.

E. Laterifloræ (vide p. 113).

§ *a*. Capsula anguste linearis elongata (vide *I. spirifer* in § D).

50. I. serrata (*Benth. in Wall. Cat.* 4771!). Glabra, caule erecto simpliciusculo v. basi ramoso, foliis (1–3 poll.) subsessilibus v. petiolo alato ovato-lanceolatis acuminatis argute serratis eglandulosis petiolo basi glandula globosa stipulata v. nuda, pedicellis gracillimis versus medium bifidis 2-floris, bracteis setaceis dissitis, floribus ⅔–1½″ albidis flavisve rubro-maculatis, sepalis parvis falcatis, calcare abrupte incurvo flore longiore, capsula anguste lineari.

Hab. Umbrosis Himalayæ temperatæ centralis et orientalis, Nepal! *Wallich*; Sikkim 8000–10,000 ped.! *J. D. H.* (fl. Jul.–Sept.). (v.v.)

Caules graciles, 1–3 pedales. *Folia* membranacea, glabra. *Flores* plani, labello oblique conice saccato, in calcar attenuato; vexillo oblongo subunguiculato, alis unguiculatis lobo postico falcato. *Capsula* 1-1½″ angustissima. *Semina* numerosa, 1-seriata, lineari-obovata, grosse tuberculata.

A smaller, more delicate and graceful species than is *I. scabrida*, D.C., with very differently shaped spur and petals.

51. I. scabrida (*D.C. Prodr.* i. 687, *Wall. Cat.* 4769 *b*; *Edgew. in Wight, l.c.* t. 323). Caule simpliciusculo robusto foliisque pubescenti-pilosis glabratisve, foliis ovatis lanceolatis ovato-lanceolatisve acuminatis in petiolum angustatis grosse serratis eglandulosis petiolo basi glandulis 2 grossis stipulato, pedunculis foliis multo brevioribus 2–6-floris, bracteis setaceis dissitis, floribus aureis, sepalis amplis ovato-cordatis acuminatis, labello late conico calcare incurvo, vexillo dorso cornuto, capsulis lineari-elongatis.—*Wall. Cat.* 4769!

I. tricornis, *Lindl. Bot. Reg.* xxvi. 1840, t. 9; *Hook. Bot. Mag.* 4051.—I. punctata, *Wall. MSS.*—I. cristata, *Wall. in Roxb. Fl. Ind.* ii. 456.—I. calycina, *Wall. l. c.* p. 463.—I. Hamiltoniana, *Don, Prodr.* 204.

Hab. Umbrosis Himalayæ temperatæ, Bhotan! *Griffith*; Nepal! *Wallich*; Kumaon! *Str. & Wint.*; Simla! *Comta Dalhousie*, &c.; Kunawur! *Grant*; Sikkim, fid. *Icon. Cathcart* (fl. temp. pluv.). (v.v.)

Species 3–5 pedalis, plerumque robusta, plus minusve pubescens, sed interdum glabra v. glaberrima. *Folia* petiolata, v. subsessilia. *Pedunculi* interdum paniculati. *Flores* 1″ longi, speciosi, aurei, punctis rubris consperse. *Capsula* 1–1¾″ longa, glabra v. puberula. *Semina* 1-seriata, oblonga, vix tuberculata.

The *I. calycina*, Wall., seems from specimens in Lindley's Herbarium to be the same as his *cristata*, and which is undoubtedly the *I. scabrida* of De Candolle. I have no Sikkim specimens, but a drawing from

Cathcart's collection of what appears to be a very pale-flowered variety of it, and which has four lateral sepals.

52. I. ARGUTA (*H. f. & T.*). Glaberrima, caule gracili ramoso, foliis 2–2½″ breve petiolatis v. petiolo alato elliptico-lanceolatis utrinque longe acuminatis argute serratis dentatisve basi setosis superioribus sæpe petiolo glanduligero sed basi glandulis non stipulato, pedunculo brevissimo 1–2-floro, bracteis setaceis elongatis tortis, pedicellis elongatis, floribus magnis cæruleis lilacinisve, sepalis oblique ovatis cuspidato-acuminatis majusculis, labello longe saccato late infundibuliformi v. campanulato calcare breviusculo hamato, vexillo dorso subrostrato.

Hab. Umbrosis Himalayæ orientalis temperatæ et tropicæ; Sikkim, alt. 5000–7000 ped.! *J. D. H.*; Mont. Khasiæ, alt. 3000–6000 ped.! *Lobb*, &c. (fl. Jun.–Oct.). (v.v.)

Species insignis 1–4 pedalis, *I. spirifer* affinis et similis, sed caules robustiores, folia majora, argute dentata v. serrata, basi ciliata (rarius nuda), petiolus sæpissime glandulosus, pedunculis brevissimis, bifloris, bracteæ elongatæ tortæ, et calcar hamatum non circinatum.—*Capsula* linearis, pollicaris. *Semina* pauca, orbicularia, opaca, granulata. *Folia* inferiora sæpius non glandulosa.

The long, subulate, twisted bracteoles of this species are quite peculiar to it; in other respects it resembles *I. spirifer*, &c. It is very common in the Khasia mountains, and is probably distributed amongst Wallich's plants, though I have failed to recognize it amongst the Linnean Society's collections, Henslow's, Bentham's, or those of Kew. In some of my Sikkim specimens there are four lateral sepals, as there are also in that figured by Cathcart's artists; in others only two.

b. *Capsula* brevis v. ignota.

53. I. DISCOLOR (*De Prodr.* i. 687; *Wall. Cat.* 4767). Caule erecto subramoso, foliis petiolatis 1–2″ ovatis acuminatis eglandulosis grosse crenato-serratis supra pilosulis, pedicellis breviusculis 2-floris, bracteis parvis late ovatis dissitis, floribus magnis, sepalis parvis ovatis acuminatis labello longe saccato ventricoso calcare brevi incurvo v. circinato, vexillo dorso cornuto.

I. insignis, *Wall. Cat.* 4766, in part.

β. Glăberrima, foliis glaberrimis.

Hab. Himalaya centrali temperata, Nepal! *Wallich*; montibus Sikkim! et Khasia! umbrosis humidis (fl. Jul.–Sept.). (v.v.)

Caulis 3–5 pedalis. *Folia* membranacea, majora et latiora quam in *I. elegans* et *arguta*. *Pedunculi* gracillimi, foliis breviores, arcuati, iis *I. longipes* et *urticifolia* similes, sed breviores, pedicellis capillaceis. *Flores* 1½″ longi. *Capsulæ* lineari-clavatæ, immaturæ?

I. urticæfoliæ simillima et forsan ejus varietas, sed bracteæ breviores et folia apice non caudato-acuminata; calcare involuto non abrupte inflexo.

A very common and variable species, probably not distinct from *I. urticæfolia*, but the inflorescence is more lateral on the plant, and the leaves more uniform, and less crowded upwards.

54. I. PORRECTA (*Wall. Cat.* 7275!). Humilis, pedalis, glaberrima, caule simplici basi repente radicante dein erecta, foliis pollicaribus longe petiolatis ovato-ellipticis acutis serrulatis basin versus biglandulosis, pedunculis paucis folio brevioribus 2–3-floris, bracteis setaceis, floribus cum calcare $1\frac{1}{2}$ pollicaribus flavis, sepalis parvis ovatis acuminatis, labello subconice saccato calcare sensim attenuato apice hamato terminato.

Hab. Paludibus temperatis montibus Khasiæ! *Wallich*, prope Kalapane, alt. 5000–6000 ped., *J. H. & T. T.* (fl. Aug.). (v.v.)

Species pulchra, *I. discolor* proxime affinis. *Caules* vix pedales, crassiusculi, ad basin petiolorum non glandulosi. *Folia* pauca, 6–8″, petiolo $\frac{2}{3}$–1″. *Pedunculi* et pedicelli graciles. *Flores* pro planta magni, pallide aurei v. straminei, lineis rubris pulchre striati, vexillo dorso rostrato. *Capsula*?

In habit and structure of the flower this is very closely allied to *I. bella*, but has always several flowers on one peduncle, &c. (see notes under *I. bella*).

55. I. BELLA (*H. f. & T.*). Sparse puberula, uniflora rarius biflora, caulibus simpliciusculis 3–5″ basi repentibus dein erectis, foliis 1–$1\frac{1}{2}$″ paucis membranaceis longe petiolatis late ovatis subacutis crenulatis, pedicello erecto gracili pubescente medio bracteolato 1–2 flore, sepalis majusculis oblongo-lanceolatis acuminatis, labello conice saccato in calcare gracili torto puberulo producto, vexillo late obovato dorso cornuto alis bilobis lobo basali auriculæformi terminali obovato elongato.

Hab. Paludibus temperatis mont. Khasiæ! *Griffith, Lobb*; prope Kalapane alt. 5000 ped., *J. H. & T. T.* (fl. Aug.). (v.v.)

Planta pulcherrima, membranacea, sicca flaccida. *Caules* basi simplices v. ramosi. *Petioli* $\frac{1}{2}$–1″, pubescentes, nudi v. parce setosi. *Folia* subtus nitida, basi interdum glanduligera v. setosa. *Flores* tenerrimi, $\frac{2}{3}$″ longi, aurantiaci v. aurei, petalis labelloque intus purpureo-striolatis. *Ovarium* glaberrimum, $\frac{1}{3}$″. *Capsula* elliptico-lanceolata, pubescens. *Semina* subrotunda, papilloso-pubescentia.

Closely allied to *I. porrecta*, Wall., which has always several flowers on each peduncle, but the bracts are narrower, the whole plant more membranous and pubescent, the lateral sepals are larger, and the long lobe of the alæ much longer.

56. I. RACEMULOSA (*Wall. Cat.* 7274!). Glaberrima, caule crassiusculo simplici v. basi ramoso foliis 1–2″ petiolatis ovatis lanceolatisve acuminatis obtuse serratis eglandulosis, racemis folio brevioribus 6–8-floris, pedunculo flexuoso, bracteis oblongis, pedicellis gracilibus,

floribus $\frac{3}{4}''$ intense violaceis, sepalis majusculis oblique ovatis acutis, labello cymbiformi calcare breviusculo incurvo flore æquilongo, vexillo parvo orbiculari, alarum lobo postico maximo late semiorbiculari obtuso.

Hab. Locis udosis apertis temperatis et subtropicis montibus Khasiæ; alt. 4000–5000 ped.! *Gomez, Lobb, J. H. & T. T.* (fl. Jun.–Oct.). (v.v.)

Species pulcherrima, nullæ arcte affinis. *Caulis* 6–8″. *Folia* membranacea, petiolo basi glandulis non stipulato. *Racemi* pollicares, omnes laterales, horizontaliter patentes. *Calcar* $\frac{1}{2}$–$\frac{3}{4}''$, arcuatum ascendens, apice obtuso. *Capsula* $\frac{1}{3}''$, brevis, obovato-lanceolata, basi breviter attenuata, apice acuta, oligosperma; dehiscens ab apice. *Semina* parva.

This has the fruit of many species in § B, and the racemose flower of the *Racemosæ*.

57. I. LATIFLORA (*H. f. & T.*). Caule humili robusto puberulo, foliis petiolatis lanceolatis elliptico-lanceolatisve acuminatis crenato-serratis basi sæpissime glanduloso-setigeris subtus glaucis, pedunculis erectis crassis bis terve divisis simplicibusve, bracteis dissitis lanceolatis, floribus magnis roseis, sepalis amplis late ovatis acuminatis, labello cymbiformi in calcar rectum v. paulo curvum gracile elongatum abrupte contracto, vexillo dorso alato.

Hab. Umbrosis subtropicis montibus Khasia ad Nunklow, alt. 3000–4000 ped. *Lobb, J. H. & T. T.* et ? Himalaya orientali tropica Sikkim, alt. 2000–4000 ped., *J. H.* (fl. Oct.).

Statura habitu plerisque notis *I. pulchræ* proxima, sed differt floribus conspicuis, calcare gracili elongato, non cum sepalo conico sensim continuo. *Flos* $1\frac{1}{2}$–$2''$ latus, pallide roseus v. violaceus; calcare 1 ; petalis patentibus amplis; vexillo orbiculari bilobo, alis bipartitis lobis patentibus antico obovato retuso postico semiovato acuto. *Capsula* et semina immatura sed *I. pulchræ* ut videtur similia.

The Sikkim specimens look different; they have broader leaves and single smaller flowers on ebracteolate peduncles, but from drawings of both, taken on the spot, I am unable to point out any further differences between them.

58. I. PULCHRA (*H. f. & T.*). Humilis, glaberrima, caule simplici, foliis 2–3″ crassiusculis petiolatis elliptico- v. anguste lanceolatis acuminatis serratis subtus pallidis, pedunculis erectis crassis bis terve divisis simplicibusve, bracteis dissitis lanceolatis, floribus magnis, sepalis amplis late ovatis acuminatis, labello magno late infundibuliformi in calcar conicum apice circinatum attenuato, alis amplis, vexillo dorso alato.

Var. *β*. Foliis latioribus ellipticis v. ovato-lanceolatis nervis numerosis.

Hab. Umbrosis montibus Khasia regione temperata et subtropica alt. 5000 ped.! *J. H. & T. T.*—Var. *β*. Nepalia maxime orientali, alt. 4000–5000 ped.! *J. H.* (fl. Sept.–Nov.) (v.v.)

Species pulcherrima, caule crassiusculo simplici v. diviso 4–8″. *Folia* basi interdum setigera, nervis primariis in var. *a* paucis sub 8, margine parallelis, in var. *β*, 8–12, divergentibus. *Flos* 1½″ longus, pallide roseus v. stramineus, rubro striatus. *Capsula* elliptico-oblonga, erecta, polysperma. *Semina* parva, lanata ?—*Flores* interdum solitarii. *Capsulæ* et semina *I. linearis.*

This is similar in some respects to *I. acuminata,* Benth., but differs in the flowers being considerably larger, not umbellate, and the leaves broader; the sepals and petals also are of a very different form.

59. I. FRUTICOSA (*D.C. Prodr.* i. 687; *Wall. Cat.* 4762!). Caule erecto robusto ramoso, foliis 3–5″ longe petiolatis pubescentibus subsericeis glabratisve ovato lanceolatis acuminatis serratis crenatisve, petiolis 1–2 glandulosis tomentosis, pedunculis glabris folio brevioribus 3–5-floris, bracteis linearibus, pedicellis valde elongatis gracilibus, floribus amplis, sepalis magnis ovatis cuspidatis, labelli limbo brevi cymbiformi, calcare elongato curvo ascendente, vexillo late orbiculari bilobo, alis bipartitis segmentis divaricatis.—*Wight & Arn. Prodr.* 137; *Wight, Ic.* 966.

Hab. Sylvis montosis tropicis Malabariæ ad Kottergherry et Coonoor! (non alibi), *Wight* (fl. Aug. et Mart.).

Planta insignis, 8-pedalis, floribunda. *Caulis* ad cicatrices nodosus. *Folia* interdum glabra, sæpissime appresse pubescentia, glandulis petioli sessilibus. *Flores* 1½″ lati, calcare 2-unciali. *Pedunculi* plerumque in pedicellos 3, 2–4 unciales divisos, vel umbellam 2–4-florem gerens. *Capsula* magna, ¾″ longa, anguste elliptica, rostrata, polysperma. *Semina* glabra.

60. I. JURPIA (*Ham. Wall. Cat.* 4761!). Fruticosa, caule elato ramoso, foliis 3–5″ petiolatis oblique ovatis ovato-lanceolatisve longe acuminatis serratis nervis subtus puberulis basi petioloque glandulosis, pedunculis axillaribus subterminalibusque gracilibus 2–4-floris, sepalis parvis, vexillo dorso cornuto, labello subconice saccato ventricoso in calcar subelongatum validum curvum contracto, alis labello minoribus.

Var. *β*. Mutica, calcare et cornu vexilli brevioribus.

Hab. Sylvis umbrosis tropicis Himalayæ centralis et orientalis, Nepal! *Hamilton, &c.*; Sikkim, alt. 3000–5000 ped.! *Griffith, &c.* (fl. Sept.–Nov.). (v.v.)

Caulis 5–8 pedalis, ramosus, crassiusculus, basi sublignosus; ramulis pubescentibus glabrisve, plerumque flexuosis. *Folia* submembranacea, supra nitida, glaberrima v. pilosula, setis glanduligeris basin versus gracilibus. *Pedunculi* 3–5″, glabri v. puberuli. *Bracteæ* caducæ. *Pedicelli* pollicares et ultra. *Flos* sordide albidus v. flavus v. aurantiacus, cum calcare rubro 2-pollicaris. *Sepala* acuta obcuneata dorso longe rostrata v. erostria. *Capsula* anguste lineari-oblonga, pollicaris, glaberrima. *Semina* pauca, 4–6 apicem versus capsulæ, parva, opaca, suborbicularia, tuberculata.

61. I. PUBERULA (*De Prodr.* i. 687; *Wall. Pl. As. Rar.* ii. 193; *Cat.* 4767 A). Plus minusve pubescens v. glabrata, caule elongato simplici v. ramoso, foliis 1–5″ in petiolum attenuatis elliptico- v. ovato-lanceolatis utrinque acuminatis crenatis eglandulosis, pedicellis bracteolatis 1–4-floris solitariis v. binis gracilibus erectis axillaribus subterminalibusque floribusque violaceis pubescentibus, sepalis majusculis ovatis acuminatis, labelli limbo cymbiformi, calcare longo gracili curvo, alis patentibus, capsula lineari.

I. mollis, *Wall. in Roxb. Fl. Ind.* ii. 461.—I. hispidula, *Bth. Wall. Cat.* 4740!—I. insignis (in part.), *Wall. Cat.* 4766.

β. Pedunculis 2–4-floris.

Hab. Sylvis subtropicis temperatisque Himalayæ orientalis et centralis; Nepal! *Wallich*; Sikkim, 3000–6000 ped.! *J. D. H.*—*β*. Mont. Khasia, alt. 5000–6000 ped.! *J. H. & T. T.* (fl. June–Dec.). (v.v.)

Species variabilis, erecta, 1–3-pedalis; caule simplici v. parce ramoso. *Folia* basi non ciliata v. setigera. *Pedunculi* 1–3 pollicares, basi bracteati. *Flores I. flaccidæ*? subsimiles. *Calcar* gracile, ½″. *Capsula* glaberrima, pollicaris. *Semina* (immatura) parva?.

In all Wallich's Nepal and our Sikkim specimens the peduncles are 1-flowered, in our Khasia ones 2–4-flowered.

c. Perennes. Epiphyticæ. *Caules* breves, crassi. *Folia* versus apices ramorum conferta. *Pedunculi* 2–3-flores. *Capsulæ* breves, rostratæ.

62. I. JERDONIÆ (*Wight in Madr. Journ. Sc.* v., *Ic.* t. 1602). Epiphytica, glaberrima, caule brevi procumbente radicante, ramis floriferis ascendentibus, foliis gracile petiolatis ovatis acutis sinuato-subserratis sinubus et apice setulosis, pedicellis gracilibus pedunculo longioribus, sepalis lanceolatis, labello longe saccato ventricoso, calcare brevi incurvo.—*Hook. Bot. Mag.* 79, t. 4739.

Hab. Ramis truncisque arborum Mont. Anamallay et Nilghiri ad Sispara Ghat.! *Wight.*

Rami cicatricati. *Folia* 1½–2½″ longa, petiolo ½–¾″, utrinque glaberrima. *Pedunculi* cum pedicellis folia æquilonga. *Flores* rubri, labellum magnum inflatum, fere pollicare, vexillum alæque parvæ. *Sepala* petalis æquilonga, alæ oblique bilobæ, lobis imbricatis rotundatis. *Vexillum* galeatum.

This, as Wight observes, is most nearly allied to *I. Walkeriæ*. The latter I have been obliged to put in the racemose group of the order, though, with the present and two following, it forms the most natural section of the genus.

63. I. AURICULATA (*Wight in Madr. Journ. Sc.* v. p. 8. t. iii.). Epiphytica, glaberrima, caule brevi crassissimo nodoso articulato, foliis petiolatis ovatis ellipticisve acutis subserratis, pedunculis brevibus 2-floris, pedicellis gracilibus, sepalis maximis dependentibus, vexillo brevi concavo profunde bifido, labello longe saccato apice breviter calcarato.

Hab. Peninsulæ montibus prope Courtallam! *Wight.*

Species valde singularis, *I. Jerdoniæ* arcte affinis sed caulibus crassioribus sæpe nodosis, pedunculis brevioribus, sepalis labello æquilongis, et calcare breviore.

64. I. VIRIDIFLORA (*Wight in Madr. Journ. Sc.* v. p. 9). Glaberrima, caule brevi crassissimo ramisque nodulosis, foliis crasse petiolatis ovato-lanceolatis acutis serratis, pedunculis brevibus bifloris, pedicellis gracilibus, sepalis linearibus, vexillo alte bilobo dorso alte carinato, labello conice subsaccato in calcar incurvum angustato.

Hab. Malabar ad Mont. Shivagherry! *Wight.*

I. auriculatæ et *I. Jerdoniæ* arcte affinis; sed caule crassiore, foliis majoribus, 3″ long, nervis validioribus, sepalis lanceolatis, labelloque vix saccato sed in conum incurvum apice uncinatim calcaratum sensim attenuatum.

F. UMBELLATÆ et CAPITATÆ (vide p. 113).

Vide *I. Goughii, trilobata, sulcata,* &c., in § C; *I. longicornu, racemosa,* et *bicornuta* in § G.

65. I. BRACTEATA (*Coleb. MSS. in Roxb. Fl. Ind. Ed. Carey*, ii. 458; *Wall. Cat.* 4760!). Glaberrima, caule erecto parce ramoso, foliis longe petiolatis ovato-lanceolatis utrinque acuminatis subserratis basi ciliatis, pedunculo terminali apice densifloro, bracteis magnis recurvis crinitis, floribus purpureis.

I. fimbriata, *Hook. Exot. Flor.* ii. t. 146.

Hab. Mont. Khasia paludibus subtropicis temperatisque, alt. 4000–6000 ped.! *De Silva, Griffith,* &c. (fl. Jun.–Aug.). (v.v.)

Planta pulcherrima, pedalis et ultra ob. bracteas crinitas distinctissima. *Flores* purpurei. Exemplaria depauperata ludunt floribus fere ebracteatis v. bracteis subulatis.

66. I. JANTHINA (*Thwaites, En.* p. 68). Herbacea, pusilla, simplex, glaberrima, foliis 1–4 membranaceis ovatis late oblongisve acuminatis denticulatis, petiolo eglanduloso, sepalis oblongis subacutis, vexillo rotundato, labello, infundibuliforme in calcar incurvum sensim producto.

Hab. Ceylon! *Walker,* regione tropica, *Thwaites.*

Species parvula, 3–5-pollicaris. *Folia* sæpissime 2 opposita 1–4″ long. $\frac{1}{2}$–2 lat. *Pedunculus* 2–3″. *Pedicelli* breviter racemosi, bracteis ovalibus persistentibus. *Flores* pulchre violacei, $\frac{1}{2}$–$\frac{3}{4}$″ lat. *Capsula* polysperma.

67. I LEUCANTHA (*Thw. En.* p. 67). Herbacea, pusilla, simplex, foliis approximatis lanceolatis acuminatis denticulatis parce pilosis basin versus petioloque subalato glanduloso-setigeris, labello in calcar æquilongum rectum conicum apice (siccum) subabrupte attenuatum producto, alarum lobo posteriore parvo lanceolato, anteriore multo majore inæqualiter 3-partito apicibus rotundatis.—*Descr. Ex. Cl. Thwaites.*

Hab. Hinidoon and Kittoot Gala in Ceylon, *Thwaites.*

"Ab *I. appendiculata*, quæ valde similis affinisque calcaris petalorumque forma præcipue differt. *Flores* albi, sepalo anteriore rufo-galeato."—*Thw.*

I have not seen Thwaites' specimens, but fear I may have confounded this species with *I. appendiculata.*

68. I. LINEARIS (*Arn. in Hook. Comp. Bot. Mag.* ii. 323). Humilis, glaberrima, caule simplici robusto, foliis approximatis anguste lineari-lanceolatis acuminatis serratis subcoriaceis, bracteis ovatis acuminatis, pedicellis filiformibus, sepalis breviusculis ovatis acuminatis, labello concavo brevissime calcarato, vexillo brevi dorso cornuto, alis magnis bipartitis segmento laterali minore terminali magno obovato unguiculato.

Var. *β.* Foliis petiolatis elliptico-lanceolatis.

Hab. Sylvis montosis subtropicis Ceyloniæ, alt. 4000–6000 ped.! *Walker*, &c.

Caules subcæspitosi, 4–6″. *Folia* 2–3″ in petiolum brevem angustata. *Flores* $\frac{2}{3}$″ longi. *Capsulæ* ellipticæ, glaberrimæ.

69. I. APPENDICULATA (*Arn. in Hook. Comp. Bot. Mag.* ii. 323.). Herbacea, pusilla, glabra v. pilosula, foliis approximatis v. verticillatis petiolatis ovatis lanceolatisve utrinque acuminatis setuloso-serratis membranaceis, pedunculis elongatis, bracteis lanceolatis, pedicellis filiformibus, sepalis ovatis oblongisve, labello parvo saccato apice breviter calcarato, vexillo parvo gibbo, alis bipartitis.—*Thwaites, En.* 47.

α. Foliis oblongo-lanceolatis acuminatis, pedunculis folia superantibus.

β. Foliis ovatis, pedunculis foliis brevioribus.

γ. Foliis 3–5 ovatis verticillatis pubescentibus.

δ. Foliis verticillatis anguste elliptico-lanceolatis.

Hab. Sylvis montosis subtropicis Ceyloniæ! *Walker*, &c.

Species parvula, variabilis, 4–8″. *Folia* flaccida, 1–6″. *Flores* valde membranacei, "albidi v. pallide rosei; vexillum transverse rubro-striatum, alis bilobis; lobo, antico parvo lanceolato longe caudato, posticis majore, semicordato acuminato."—*Thw.*

70. I. UMBELLATA (*Heyne in Roxb. Fl. Ind. Ed. Wall.* ii. 464; *Wall. Cat.* 4759!). Humilis, caule simplici longe nudo, foliis breve petiolatis subverticillatis ovatis obtusis acutisve crenato-serratis, pedunculis erectis foliis subæquilongis, bracteis oblongis obtusis, floribus amplis, sepalis late ovatis acutis, labelli lamina parva cymbiformi, calcare elongato gracili incurvo, vexillo orbiculari emarginato, alis subhorizontaliter patentibus bilobis lobis obtusis.—*Wight & Arn. Prodr.* 137; *Wight, Cat. N.* 745; et in *Madr. Journ. Sc.* v. p. 9. t. iv.

Hab. Sylvis tropicis montosis Malabariæ, prope Courtallum! *Wight* (fl. Aug.–Sept.).

Herbacea, 4–12″, glabra. *Radix* tuberosa (ex *Wight*). *Folia* 1–4″, obtusa, crenata. *Flores* 5–6, sub ⅔ lati. *Capsula* breviter elliptica, glabra. *Semina* echinata (*Wight*).

71. I. SUBCORDATA (*Arn. in Hook. Comp. Bot. Mag.* ii. 323). Caule simplici longe nudo v. basi repente ramoso, foliis longe petiolatis ovatis v. ovato-lanceolatis subacutis v. acuminatis basi cordatis rotundatisve grosse crenatis, pedunculis folio brevioribus, bracteis ovato-lanceolatis acuminatis, pedicellis gracilibus, sepalis oblongo-ovatis acuminatis majusculis, labelli lamina cymbiformi acuminata calcare elongato acuminato gracili incurvo, alis latis.—*Thw. En.* 67.

Hab. Sylvis montosis subtropicis Ceyloniæ, alt. 5000–6000 ped.! *Walker*, &c. (fl. Sept., Oct.).

Species variabilis. *Caules* 4–10″. *Folia* 1–3″, obtusa v. acuta, petiolo elongato. *Flores* albidi, sepalis rufescentibus. *Capsula* parva, ⅓ unc. longa.—*I. umbellatæ* valde affinis, differt bracteis acutioribus foliisque basi cordatis v. rotundatis.

72. I. UNCINATA (*Wight in Madr. Journ. Science*, v. p. 11. t. vi., *Icones*, t. 747). Caule erecto, foliis 2–3″ longe petiolatis ovatis ovato-cordatisve acuminatis serratis supra nervis pubescentibus subtus glaberrimis, petiolo apice glanduloso, pedunculis axillaribus elongatis erectis, bracteis parvis, floribus 4–8 mediocribus approximatis, pedicellis brevibus, sepalis amplis oblique ovatis acuminatis, labello subhemispherico calcare brevi ventricoso basi constricto apice uncinato, vexillo oblongo, alis bipartitis.

Hab. Sylvis tropicis Malabariæ, ad Courtallam! *Wight* (fl. Aug., Sept.).

Caules graciles. *Petioli* 1–2″. *Pedunculi* foliis breviores, 3–4″. *Pedicelli* ½″. *Flores* sub 1″ longi. *Alæ* lobo antico minore horizontaliter patente, postico semiovato obtuso. *Capsula* brevis, rostrata, oligosperma.

73. I. VISCIDA (*Wight in Madr. Journ. of Science*, v. p. 12, *Icones*, t. 746). Caule gracili erecto basi repente radicante angustato, foliis 2–3″ longe petiolatis ovatis acuminatis serratis nervis utrinque hispidulis, pedunculis axillaribus erectis filiformibus viscidis 2–4-floris, bracteis majusculis ovatis acuminatis, pedicellis breviusculis approximatis, floribus majusculis, sepalis amplis late ovatis longe acuminatis, labello brevi cymbiformi calcare longo gracili incurvo, vexillo oblongo acuminato, alis bipartitis lobis, semiovatis.

? An I. cordata, *Wight in Madr. Journ. Sc.* v. p. 10.

Hab. Montibus subtropicis Pulney Malabariæ, alt. 5500 ped.! *Wight.*

Caulis ut videtur flexuosus. *Petioli* 1–3″. *Pedunculi* 4–5″, graciles. *Bracteæ* ¼″ longæ. *Flores* rosei v. purpurascentes. *Capsula* elliptica, acuta, polysperma. *Semina* orbiculata, pilosa.

The *I. cordata*, Wight, from Dr. Wight's specimens, collected in the Shevagherry Hills, appears to differ from *I. viscida* only in the subcordate base of the leaves.

74. I. ACUMINATA (*Benth. in Wall. Cat.* 4754 !). Humilis, glaberrima, caule crasso simplici, foliis approximatis longe lanceolatis in petiolum angustatis acuminatis sinuato-crenatis subcoriaceis subtus glaucis nervis margine subparallelis, pedunculis axillaribus crassiusculis, bracteis magnis late ovatis obtusis, floribus magnis, sepalis majusculis oblique ovato-cordatis obtusis acuminatisve, labello limbo cymbiformi acuminato, calcare elongato sensim angustato incurvo, vexillo orbiculato, alis bipartitis.

Var. *α*. Foliis lanceolatis longius petiolatis apice elongatis.

Var. *β*. Foliis angustioribus interdum 6-pollicaribus.

Hab. Rupibus madidis Mont. Khasia regione subtropica, alt. 4000–5000 ped. ! *De Silva*, &c. (fl. Aug., Sept.). (v.v.)

Habitu *I. lineari* proxime affinis, sed major floribusque diversissimis. *Caules* cæspitosi, 5–14″, stricti, erecti. *Folia* ½–1″ lata, subtus pallida. *Flores* speciosi, pallide rubri, pollicares. *Capsulæ* breves, erectæ, ⅓″, oblongæ, subacutæ. *Semina* minima, lana fusca immersa !

75. I. HOOKERIANA (*Arn. in Hook. Comp. Bot. Mag.* ii. 324). Fruticosa, perennis, ramis crassis, foliis petiolatis carnosulis 3–6″ ovalibus acutis acuminatisve crenato-serratis, petiolis apice biglandulosis, pedunculis robustis erectis elongatis, floribus maximis 4–6 longe pedicellatis umbellatis, sepalis majusculis oblongo-lanceolatis, labelli limbo parvo cymbiformi abrupte in calcar crassum elongatum attenuatum contracto, petalis amplis, vexillo orbiculari.—*Bot. Mag.* 79, t. 4704.

? I. biglandulosa, *Moon, Cat.* 18.

Hab. Montibus tropicis Ceyloniæ, alt. 3000–5000 ped., *Walker*, &c.

Species magnifica, elata, glaberrima. *Rami* crassitie digiti. *Petioli* 2–5″, apicem versus glandulis 2-stipitatis. *Folia* multinervia. *Pedunculi* crassi, 4–6″. *Bracteæ* deciduæ. *Pedicelli* 1–2″. *Flores* speciosi, 2″ lati, calcare interdum 2″ curvo; petalis lateralibus et vexillo subæqualibus, margine crispatis, albis ? rubro-striatis. *Capsula* pro planta parva, ¾″ elliptico-lanceolata gibba, glabra.

76. I. grandis (*Heyne in Wall. Cat.* 4759 !).—*Arn. in Hook. Comp. Bot. Mag.* 324, *Madr. Journ. of Science*, v. t. iv.

Hab. Mont. tropicis Malabariæ ! *Heyne*, et ? Ceyloniæ, *Walker*.

Omnia *I. Hookerianæ*, sed labello conico-infundibuliformi in calcar 2-pollicare sensim attenuatum, et petalo postico minore.

Thwaites suspects that this does not differ specifically from *I. Hookeriana*, and I have no doubt that he is right.

77. I. CAMPANULATA (*Wight in Madr. Journ. of Sc.* v. 11. t. vii., *Icones*, t. 744). Erecta, caule robusto, foliis 4–6″ petiolatis late ovato- v. elliptico-lanceolatis acuminatis setuloso-serratis subtus glaucis, pedunculis axillaribus crassiusculis suberectis 3–4-floris foliis brevioribus, floribus umbellatis, bracteis magnis ovato-lanceolatis, floribus magnis, sepalis

amplis oblique ovatis rostrato-acuminatis, labello parvo cymbiformi calcare perbrevi incurvo, vexillo orbiculari mucronato, alis bipartitis.

Hab. Montibus subtropicis Pulney Malabariæ, alt. 5500 ped., *Wight*.

Caulis subramosus, herbaceus. *Folia* eglandulosa. *Pedunculi* 3″. *Bracteæ* ½–¾″. *Flores* 1½″ longi, subcampanulati, pallide purpureo-maculati. *Capsula* elliptica, utrinque attenuata, glaberrima. *Semina* plurima, creberrime echinata.

Very similar in many points to *I. lævigata*, but the common peduncles of the flowers are much longer, and the habit is very different.

78. I. LÆVIGATA (*Wall. Cat.* 4753 !). Caule elato robusto fruticoso, foliis 4–6″ breve v. longe petiolatis oblongo- v. obovato-lanceolatis longe acuminatis late crenato-serratis basi petiolove glandulosis, pedunculis axillaribus terminalibusque brevibus 2–3-floris, floribus flavis, bracteis oppositis sepalisque amplis late ovatis rotundatisve acuminatis, labello conice saccato ventricoso calcare breviusculo uncinato terminato.

Hab. Sylvis umbrosis subtropicis tropicisve Himalayæ orientalis ad Sikkim, alt. 2000–4000 ped.! Montibus Khasia, alt. 3000–5000 ped.! *De Silva*, &c. (fl. Jul.–Oct.). (v.v.)

Caulis 4–6-pedalis, lignosus, ramosus; ramis nodosis, glabris puberulisve. *Folia* basi sæpius obliqua, luride viridia. *Pedunculi* ½–1″, robusti. *Flores* subcampanulati, flavi v. sordide straminei, rubro-striati, 1–1¼″ longi. *Capsula* ignota.

Species ob staturam, ramos lignosos, pedunculos breves 2–3-flores, bracteas magnas, flores flavidos, sepala ampla facile recognita.

A tall branched suffruticose species, with much of the habit of *I. Jurpia*, but readily distinguished by the large orbicular outer sepals.

79. I. TAVOYANA (*Benth. Wall. Cat.* 4773 !). Humilis, caule crassiusculo basi nudo, foliis 3–3″ petiolatis ovatis acutis v. longe acuminatis integerrimis v. remotiuscule setoso-serrulatis basi longe setosis, pedunculis gracillimis foliis longioribus 8–14-floris, bracteis setaceis, pedicellis gracilibus; floribus parvis, sepalis subulatis, labello cymbiformi purpureo striato calcare recto subulato æquilongo, alis longe unguiculatis, capsula parva angusta lanceolata utrinque attenuato-acuminata oligosperma.

I. Tavagua, *Benth. sphalm. in Steud. Nomen.*

Hab. Peninsula Malayana ad Tavoy Gomez, Moulmein ! *Lobb.*

Species elegans, parviflora, *Circeæ* habitu, glaberrima. *Caules* simplices v. ramosi, 3–6″. *Folia* pallide viridia, nitida, ut videtur flaccide membranacea; nervis paucis tenuibus. *Pedunculi* 3–4″. *Pedicelli* capillares, pollicares. *Flores* pallide straminei vix ½″ longi, vexillo ut videtur dorso breviter rostrato; alarum lobo terminali semiobovato, apice uncinato. *Capsula* sub ⅓″ longa, torulosa, 2–3-sperma. *Semina* oblonga, compressa, opaca.

G. Racemosæ (vide p. 113).

§ a. *Racemi* multiflores, pedicellis interrupte verticillatis, v. fasciculatis.

80. I. racemosa (*Wall. Cat.* 4730! in part., non *Don, Prodr.*). Glaberrima, caule gracili simpliciusculo erecto, foliis 3–5″ petiolatis lanceolatis v. elliptico-lanceolatis utrinque acuminatis apice caudatis grosse crenatis, pedunculis elongatis strictis gracilibus multifloris pedicellis verticillatis gracilibus bracteis parvis ovato-subulatis, sepalis minimis labello longe conice saccato in calcar curvum attenuato, vexillo orbiculato, alarum lobo terminali brevi v. elongato ligulato v. caudato; capsula lineari.—? *Edgeworth in Linn. Trans.* xx. 41.

I. micrantha, *Don, Prodr.* 205?

β?. Floribus majoribus, lobo terminali petalorum ligulato porrecto.

γ, *polyceras.* Bracteis majoribus sepalis apice labelli et dorso vexilli in cornu glanduloso-incrassatum productis.

Hab. Sylvis Himalayæ temperatæ, alt. 7000–10,000 ped., Nepal! *Wallich*; Sikkim! *J. D. H.*; β, Sikkim! alt. 7000–10,000 ped., et in Montibus Khasia, alt. 5000–7000 ped.! *J. H. & T. T.* (fl. Jul.–Sept.). (v.v.)

Herba 2–4-pedalis. *Folia* 4–6″, grosse crenata, sinubus setigeris, petiolis basi sæpe glanduligeris. *Racemi* 3–6″, stricti, pedicellis 1″, verticillatis. *Bracteæ* basi ovatæ, apice sæpius elongato glanduloso-incrassato. *Flores* sub $\frac{1}{2}$–$\frac{2}{3}$″ longi, pallide flavi v. pallide sordide lilacini. *Calcar* rectum v. paulo curvum, interdum apice bifidum. *Capsula* $\frac{3}{4}$–1″, apiculata, æqualis, teretiuscula. *Semina* opaca.—Variat ut videtur lobo inferiore alarum brevi v. elongato et porrecto.

Under *I. racemosa* in Wallich's Herbarium there are at least three plants, viz., the *I. leptoceras* and two others, which appear to differ chiefly in the racemes of one being interruptedly whorled, and of the other continuous: as Mr. Edgeworth has described the latter under the name of *I. tingens*, I have retained Wallich's name for the former.

The *I. tingens*, Edgeworth, appears to differ in no respect from this and from specimens marked *I. racemosa* in *Wall. Herb.*, except in the flowers not being verticillate, and in the remarkable character of the posticous lobes of the lateral petals (alæ) being included in the spur, which I cannot but regard as an anomalous character. The whorled pedicels, numerous long erect racemes, small flowers and straight spur best distinguish *racemosa.* The var. γ approaches very closely *I. leptoceras*, var. θ; γ is distinguished only by the whorled inflorescence.

81. I. bicornuta (*Wall. in Roxb. Flor. Ind.* 11. 461, *Cat.* 4729 & 4765 in *Herb. Henslow*). Erecta, ramosa, foliis amplis approximatis ovato-acuminatis grosse crenato-serratis, racemis confertis erectis elongatis interruptis, pedicellis fasciculatis verticillatisque, floribus 1″, lilacinis, sepalis late ovatis, labello inflato incurvo ascendente ore apicem versus in cornu producto, calcare brevi recurvo, capsula cylindrica.

I. longicornu, *Str. & Wint. Herb.* no. 4.

Hab. Himalaya centrali et occidentali Garwhal! *Strachey & Winterbottom*; Nepal! *Wallich* (fl. temp. pluv.).

A large-leaved, membranous, flaccid, very much branched species, but distinguished by the inflated saccate incurved labellum, rather suddenly terminating in a short recurved spur, as also by the long, erect, slender racemes, with whorled peduncles, slender capsules, and large pale lilac flowers. The petals terminate in long slender tails.

82. I. LONGICORNU (*Wall. Cat.* 4729, non *Flor. Ind.*). Erecta, ramosa, glabra, foliis alternis ovatis ovato-lanceolatisve glanduloso-stipulatis grosse crenato-serratis dentibus setigeris, pedunculis lateralibus et versus apices ramulorum fasciculatis erectis strictis elongatis multifloris, floribus versus apices pedunculi corymbosis racemosisve 1″ long. bracteis ovato-subulatis, sepalis parvulis oblique ovatis, labello longe saccato obtuso v. conico v. abrupte cornuto, capsula lineari-elongata recta stricta cum pedunculo directione continua.

a. Labello conice saccato, in calcar gracile incurvo attenuato.—I. longicornu, *Wall. Cat.* 4729, *Herb. Henslow et Lindley.*

β, umbrosa. Labello subcylindrice saccato in calcar breve tenue incurvum abrupte desinente.—I. umbrosa et I. amphorata, *Edgew. in Linn. Trans.* xx. 39; I. picta, *Floral Cabinet*, t. 128, fid. *Herb. Lindley*: ad *I. sulcatam* tendit.

γ, cristigera. Labello ut in *a*, floribus luteis aureisve rubro-venosis.—I. cristigera, *Edgw. MSS.* an sp. distincta?

δ, bicolor. Labello inter *a* et *β* media, petalisque aureis, petalo antico roseo.—I. bicolor, *Royle, Ill.* p. 151. t. 28.

ε, pallens. Floribus minoribus pallidis, labello ut in *a*.—I. pallens, *Edgw. in Linn. Trans.* xx. 39.

Hab. In Himalaya temperata media et occidentali, alt. 5000–10,000 ped., ad Nepal! *Wallich*, ad Marri! *Fleming.*—Var. *a*, Nepal! ad Marri! *β*, in Himalaya boreali occidentali tota; var. *γ*, in Kulu! *Edgeworth*, et Kashmir! *T. T.*; var. *δ*, Simla et Mussooree, *Royle*; var. *ε*, Garwhal, 4000–8000 ped.! *Edgeworth* (fl. temp. pluv.). (v.v.)

The *I. longicornu* of Wallich in Roxburgh's 'Flora Indica,' is not the plant of his Herbarium, no. 4729 in *Herb. Lindley et Henslow*, which latter differs from his description in the leaves being broader, not crowded towards the ends of the branches, nor linear-lanceolate; nor does it agree with Wallich's description in being a fleshy species with approximate ventricose joints, a leafy subfastigiate panicle, and an exceedingly long filiform spur thrice the length of the pedicel, all which characters agree much better with *I. insignis*, Wall. The yellow fragrant flowers of the *I. longicornu*, described in 'Flora Indica,' are, however, unlike *I. insignis*, and suggest its being the *I. odorata*, Ham. (in *Don, Prodr.* 203), in the *I. leptoceras*, Wall., of which one Nepal specimen in Herb. Henslow (1760) well agrees with Wallich's character of *I. longicornu*. It is evident, I think, that three species have become mixed up in Wallich's published description, 'Catalogue,' and original Nepalese MSS., and that these three include that to which we now confine the name of *longicornu* together with *I. leptoceras* and *I. insignis*.

The best characters for this species are the erect branching habit, alternate leaves, long erect peduncles, with subumbellate or shortly racemose large flowers, small lateral sepals, and the labellum well developed into a long sac, which is either conical or broadly cylindric and blunt, ending in a slender spur, and especially by the narrow capsule, which forms a straight line with the peduncle, and is neither inclined nor nodding. The flowers vary greatly in number, dimensions, and colour. Small states are difficult to distinguish from various congeners, according as their habit and the colour of the flowers inclines to one or another, as to *I. laxiflora, bicornuta, sulcata*, and *Roylei*. When the flowers are simply racemose, it is not easy to distinguish this from *I. laxiflora*.

b. *Racemi* continui (non interrupti v. verticillati) pedicellis plerumque alternis. *Calcar* elongatum.

* *Malabar et Ceylon.*

83. I. MACULATA (*Wight in Madr. Journ. Sc.* vii. 12). Caule ramoso sicco profunde sulcato piloso, foliis alternis longe petiolatis estipulatis ovato-lanceolatis serratis utrinque pilosis junioribus subtomentosis, pedunculis robustis rigidis elongatis multifloris, pedicellis horizontalibus, sepalis magnis late ovato-oblongis, vexillo parvo, labello conico in calcar gracile elongatum desinente, capsula brevi.

Hab. Malabar ad Mont. Shevagherry! *Wight* (fl. Aug.).

Species pulchra, *I. elongatæ* et *cornigeræ* affinis, caulibus foliisque longe albo-pilosis racemisque validis elongatis multifloris facile distinguenda. *Caules* 2-3-pedales? sicco rigiduli, flavi, profunde sulcati. *Folia* cum petiolo 1–2-pollicari, 4–6″ long., 1½–2″ lat., membranacea, subobtuse serrata, basi nuda v. secus petiolum glandulis magnis sessilibus stipitatisve ornatis. *Racemi* interdum spithamæi, pedunculo stricto simplici v. diviso, bracteis brevibus late ovatis, pedicellis gracilibus, ¾–1″. *Flores* cum calcare subpollicares. *Capsula* ⅓″ long., medio turgida, acuminata, glabra. *Semina* pilis brevibus pustulata.

84. I. WALKERI (*Hook. Comp. Bot. Mag.* ii. 324. t. xviii.). Erecta, subramosa, foliis 2–3″ ovato-lanceolatis utrinque acuminatis setoso-serrulatis, pedunculis folio sublongioribus 6–8-floris, bracteis late ovatis acutis, pedicellis gracilibus elongatis erectis, floribus pollicaribus coccineis, sepalis parvis ovato-cordatis, labello longe late ventricoso incurvo brevissime calcarato, alis parvis bipartitis.

Hab. Sylvis subtropicis montosis Ceyloniæ, alt. 5000–6000 ped.! *Walker*, &c.

Species distinctissima ob sepalum posticum longe ventricosum saccatum incurvum petalaque parva coccinea. *I. Jerdoniæ* proxime affinis.—*Caules* 1–2-pedales.

85. I. ELONGATA (*Arn. in Hook. Comp. Bot. Mag.* ii. 324). Caule robusto, foliis 2–3″ approximatis petiolatis lineari- v. ovato- v. obovato-lanceolatis ellipticisve acuminatis argute serratis coriaceis, pedunculo longissimo robusto, racemo elongato, bracteis ovatis oblongisve subacutis, sepalis ovato-oblongis acuminatis, labello cymbiformi calcare gracili elongato incurvo, vexillo parvo, alis bilobis, capsula brevi elliptica.—*Thwaites, En.* p. 67.

Hab. Sylvis montosis subtropicis Ceyloniæ! alt. 3000–4000 ped., *Walker*, &c.

Species distinctissima, pedalis et ultra. *Folia* subcarnosa, subtus pallida, minute punctulata, nervis validis. *Pedunculus* 6″. *Racemus* 3″. *Flores* 1″, rubri. *Alarum* lobus anticus parvus, sepalis æquilongus, postico "multo majore oblique rotundato."—*Thw.*

86. I. CORNIGERA (*Arn. in Comp. Bot. Mag.* i. 323). Glaberrima, caule simpliciusculo longe nudo, foliis 3–6″ ellipticis lanceolatisve obtusis longe acuminatisve in petiolum brevem angustatis crenatis sinubus setuligeris subtus pallidis, pedunculis elongatis multifloris, bracteis late ovatis acutis, pedicellis gracilibus, floribus flavis (cum calcare ⅔″ long.), sepalis parvis ovato-cordatis acuminatis, labello infundibuliformi in calcar mediocri apice circinato attenuato, vexillo obovato acuto.—*Thw. En.* p. 67.

Hab. Sylvis montosis subtropicis Ceyloniæ; alt. 2000–4000 ped.! *Walker*, *Gardner*, &c.

Species primo intuitu calcare apice circinato, et capsula brevi oligosperma valde distincta, sed foliis variabilis. *Caulis* pedalis. *Folia* interdum late elliptica grosse crenata subtus subglabra, petiolo ½–1″. *Pedunculi* foliis longiores. *Racemus* regularis, floribus nempe subæquidistantibus, bracteisque omnibus consimilibus. *Pedicelli* vix 1″, patuli. *Flores* membranacei. *Capsula* brevis, ⅓″ longa, compressa, elliptica, utrinque acuminata, oligosperma. *Semina* 2, orbicularia, compressa, nitida.

The habit of this is that of *I. uncinata*, *subcordata*, and others of the umbellate section, but the inflorescence is decidedly racemose.

**** *Mont. Himalaya et Khasia.*

87. I. INSIGNIS (*DC. Prodr.* 1688; *Wall. Plant. As. Rar.* ii. p. 83. t. 194, *Cat.* 4760! bis!). Caule simpliciusculo robusto erecto, foliis (6-poll.) subcoriaceis lineari v. oblongo-lanceolatis basi attenuatis apice acuminatis grosse serratis dentibus apice setigeris, pedunculis 6–8 terminalibus robustis erectis elongatis 10–15-floris, bracteis caducis, sepalis amplis oblique ovatis aristato-acuminatis, labello conice saccato in calcar elongatum gracile attenuato.

I. racemosa, *Don*! *Prodr.* 203—I. insignis! *Wall. Cat.* 4766 e Nepal. in *Hb. Linn. Soc.*

Hab. Montes Sylhet, *Wall. in Herb. Linn. Soc.*! Himalaya centrali Nepal, *Wallich. fid. Plant. As. Rar.*

Species robusta, 2–3-pedalis, insignis. *Folia* angusta. *Flores* rosei. Cf. notulæ sub *I. longicornu.*

88. I. TINGENS (*Edgw. in Linn. Trans.* xx. 41 !). Caule erecto gracili ramoso, foliis 2–4″ membranaceis ovatis lanceolatisve utrinque acuminatis apice caudatis crenatis dentibus basi setigeris, pedunculis numerosis lateralibus et subterminalibus gracillimis erectis multifloris, bracteis subulatis, pedicellis capillaribus, floribus parvis (¼–⅓″) flavis, sepalis parvis ovatis obtusis, labelli sacco conico in calcar mediocre rectum v. curvum sensim attenuato, vexillo orbiculari dorso mutico, alarum lobo terminali caudato.

I. micrantha, *Don, Prodr.* fid. *Arn. in Hb. Hook.*—I. racemosa, *Wall. Cat.* 4730 in part.

Hab. In Himalaya temperata tota, alt. 5000–12,000 ped. a Simla! *Comta. Dalhousie*; ad Sikkim! *J. D. H.*; Montibus Khasia, alt. 5000–7000 ped.! *Lobb,* &c. (fl. temp. pluv.). (v.v.)

Species distinctissima, etsi characteribus a sequenti ægre distinguenda. *Caules* 2–4-pedales. *Folia* basi glandulis crassis sæpissime stipulata. *Pedunculi* 2–4″, valde graciles (ut in *I. brachycentra*). *Pedicelli* ½″, gracillimi. *Flores* inter minimos. *Calcar* forma et longitudine varium. *Capsula* lineari-clavata, lævis, ¾″, acuminata. *Semina* pauca, minuta, atra, pyriformia, rugosa.

In some of the specimens I find the posticous lobes of the lateral petals (which are extremely variable in form and shape) included in the spur, as described by Edgeworth; in others they are free, and I am disposed to regard the former arrangement as owing to an anomalous form of the petals, which are normally simply and shortly 2-lobed, as in *I. racemosa* and others.

89. I. LONGIPES (*H. f. & T.*). Glaberrima, caule gracili elato ramoso, foliis (3–4″) alternis breve petiolatis ovato-lanceolatis longe acuminatis grosse crenatis sinubus setigeris, pedunculis subterminalibus axillaribusque longissimis gracillimis arcuato-patentibus apice racemosis 5–8-floris, bracteis lanceolatis caducis, pedicellis brevibus gracilibus, floribus flavis cum calcare pollicaribus, sepalis 2–4 parvis ovato-oblongis acutis, labello infundibuliformi in calcar subelongatum hamatum attenuato, alis in caudam tortam elongatis, capsula lineari.—An *I. urticifoliæ,* Wall. var.?

Hab. Sylvis temperatis Himalayæ, alt. 8000–10,000 ped.; Kumaon! *Str. & Wint.* (5); Sikkim! *J. D. H.* (fl. Jul.). (v.v.).

A tall branched delicate species, with alternate leaves and axillary, very long patent filiform arched peduncles, bearing at the very extremity three to six pale-yellow, narrow flowers, about 1¼ inch long, a good deal like some states of *I. leptoceras.* The labellum is of the form of a cornucopia, being a long slender cone or funnel, with an incurved slender spur. The lateral petals are linear, twisted, and as long as the spurred sepal. It differs from *I. urticifolia,* Wall. (of which I expect it is a variety), in the longer peduncles, smaller, more slender flowers, and form of the spurred sepal and spur. Strachey and Winterbottom's specimen has much shorter peduncles than the Sikkim ones.

90. I. URTICIFOLIA (*Wall. in Roxb. Fl. Ind.* ii. 457, *Cat.* 4768). Glaberrima, caule elato gracili ramoso, ramis flexuosis, foliis sessilibus petiolatisque petiolo alato anguste ovato- v. oblongo-lanceolatis apice acuminatis vel caudatis crenato-serratis membranaceis, pedunculis lateralibus et terminalibus gracilibus patentibus folio brevioribus longioribusve 2–5-floris, pedicellis breviusculis bracteis, majusculis caducis, sepalis late ovatis acuminatis, labello saccato oblique conico ecalcarato vel calcare brevi incurvo subæquilongo terminato, alis caudatis, capsula lineari acuminata torulosa.

Var. *a*. Foliis ovatis, pedunculis lateralibus, floribus flavis, *Wall. Cat.* 4768 (*Herb. Henslow.*).

Var. *β*. Foliis ovato-lanceolatis longe caudato-acuminatis, pedunculis numerosis lateralibus terminalibusque 2–4-floris foliis brevioribus, floribus pallide cæruleis. (An una cum var. *γ* species distincta?)

Var. *γ*. Foliis ovato-lanceolatis grossius crenatis, pedunculis validioribus, bracteis elongatis, floribus albis v. pallide rubro-purpureis.

Hab. Sylvis umbrosis temperatis Himalayæ; *a*, Nepal! *Wallich*; *β*, Sikkim, alt. 8000-10,000 ped.! *γ*, Sikkim, 10,000–12,000 ped.! *J. D. H.* (fl. Aug.). (v.v.)

Species pulchra, 3–4-pedalis, vage ramosa. *Folia* longe caudato-acuminata et basi longe angustata; ob pedunculos sæpe 1-floros vel laterales et terminales inter hanc sectionem et § E osculat. *Petioli* non glanduligeri, nec basi stipulati. *Pedunculi* gracillimi, 1–3″, patentes. *Flores* mediocres, pallide cærulei. *Capsula* pollicaris, seminibus 1-seriatis. *Semina* magna, oblonga, fusca, testa lævi.

This is a very puzzling plant: Wallich's characters do not well agree with those of his no. 4768 in *Herb. Henslow* as to the leaves, which are shorter and broader than the description indicates. The flowers of the Nepal plant are yellow, but in the Sikkim varieties lilac, white, or purple. The leaves vary in size from 2-6 inches, and the peduncles, which are axillary and terminal, vary quite as much; generally they are very slender, patent, and filiform, but in var. *γ* often stout and erect, with large persistent subulate bracts. I find four lateral sepals in var. *γ*, of which the two accessory are often reduced to hairs. The spur is sometimes wholly absent in Sikkim specimens. The much greater size of the flowers, and their broad spurred labellum, sepal, and broad petals distinguish this from *I. longipes*, which is its nearest ally.

91. I. LEPTOCERAS (*DC. Prodr.* 1, 688, *Wall. Cat.* 4770). Glaberrima, caule erecto simplici v. ramoso folioso, foliis 2–5″ ovatis lanceolatisve utrinque attenuatis breve petiolatis setuloso-serratis, pedunculis axillaribus subterminalibusque erectis gracilibus, bracteis ovato-lanceolatis acuminatis, floribus (cum calcare) ¾–1″ longis, sepalis mediocribus late ovatis subulato-acuminatis, labello infundibuliformi in calcar gracillimum incurvum v. rectum attenuato, capsula gracili lineari-clavata.

I. longicornu, *Wall. MSS.* non *Cat.*, et *Flor. Ind. Ed. Carey*, ii. 462.—I. racemosa, *Wall. Cat.* in parte.

Var. *a*. Caule crasso nodoso, foliis anguste lanceolatis 2–5″, alarum lobo inferiore pendulo ter longiore quam lato latere gibbo.—I. leptoceras, *Wall. Cat.* 4770.—I. longicornu, *Wall. in Roxb. Flor. Ind.* ii. 462.—I. odorata, *Don, Prodr.* 213.

Var. *β*. Foliis ovatis 1–2″, alarum lobo inferiore lineari elongato obtuso.

Var. *γ*. Floribus flavis purpureo-maculatis.

Var. *δ*. Foliis lineari-lanceolatis floribus stramineis, alarum lobis rotundatis v. inferiore acuminato apices versus violaceis.

Var. *ϵ*. Foliis amplis flaccidis, floribus albis v. purpureo notatis, alarum lobo postico obtuse bilobo breviusculo.

Var. *ζ*. Foliis ovato-lanceolatis coriaceis, floribus aurantiacis, alis 3-lobis lobis brevibus.

Var. *η*. Foliis amplis pedunculum excedentibus, bracteis caducis, floribus sordide luteis rubro maculatis, alis bilobis lobo laterali breviter ovato acuto, inferiore longe subulato, sepalis 4.

Var. *θ*. Foliis amplis ovatis acuminatis, pedunculis numerosis folio longioribus, floribus pallide stramineis aurantiacisve, alis ut in *η*.

Hab. In Himalaya temperata tota a Sikkim, alt. 5000–10,000 ped.! *J. D. H.*; ad Simla! *T. T.* et in Mont. Khasia! alt. 5000–6000 ped., *Griffith*, &c.—Var. *a*, Nepal et Khasia; var. *β*, paludibus Mont. Khasia; var. *γ*, Sikkim; var. *δ*, Khasia; var. *ϵ*, Sikkim, Khasia, et Kumaon; var. *ζ*, Khasia; var. *η*, Sikkim; var. *θ*, Sikkim et Khasia (fl. temp. pluv.). (v.v.)

A very variable and common plant, of whose varieties we have had great difficulty in disposing, being at first inclined to divide our extensive series of specimens into six very local species; but when these became the subjects of comparative study along with our own and Cathcart's drawings, and with the suites of specimens from Wallich, Lobb, Strachey and Winterbottom, and especially of Edgeworth, it became at once apparent that to our six we must add as many other local species, not so much because they were distinct, as because they were intermediate in habit and characters (though not in geographical distribution) from our own. Under these circumstances we have thought it best to unite them all.

With regard to the name, we have adopted that applied by Wallich to good specimens in his own Herbarium, though under the same number we find also *I. racemosa*, *I. tingens*, and others. The *I. micranthemum*, Edgew., according to Edgeworth's specimens in Herb. Benth., is hardly different from *I. laxiflorum*, and differs from his description in *Linn. Trans.* in the flowers being fully ¾ inch long, including the spur, and not "minimi." Some of the varieties appear in the dry state to approach very closely some forms of *I. longicornu*, from which it is very difficult to distinguish them. The flowers greatly vary in size, from ½–1 inch long, including the spur, and in colour from a deep golden yellow to

white, or even pale purple, and they are often speckled with rose-colour or purple spots. Edgeworth describes a variety of his *I. micranthemum* as having the spur reduced to a small sac, from which, as well as from the size of the flowers of some of his specimens, I am inclined to suspect that his plant, or some of it, may be referable to *I. brachycentra*, K. & K. The *I. candida*, Lindl., doubtfully referred here by Edgeworth, is certainly a very different plant, having very large flowers, and being undoubtedly a variety of *I. Roylei*. Edgeworth's *I. elata* appears from his specimens to be a form of *I. leptoceras*, but the specimens are not sufficient for satisfactory determination.

This species is on the whole most nearly allied to *I. tingens*, but distinguished by its much larger flowers and longer spur; some specimens are, however, with difficulty distinguishable. There are sometimes pedicellate glands on the basal margins of the leaves.

92. I. LAXIFLORA (*Edgew. in Linn. Trans.* xx. 39). Caule elato erecto, foliis 3–6″ longe petiolatis petiolo alato ovato-lanceolatis utrinque acuminatis grosse crenatis sinubus setigeris, pedunculis numerosis gracilibus subterminalibus, racemis breviusculis, bracteis parvis ovato-subulatis, floribus aureis v. pallide purpureis cum calcare ⅔″, sepalis parvis ovato-subulatis, labello infundibuliformi in calcar rectum conicum flore longiore sensim attenuato, vexillo orbiculari concavo non cornuto, alis majusculis purpureis rotundatis v. inferiore longe caudato, capsula angusta lineari.

I. micranthemum? *Edgew. in Linn. Trans.* xx. 39.

Hab. Himalaya temperata, Sikkim, alt. 9000–11,000 ped.! *J. D. H.*; Garwhal et Kumaon! *St. & W.*, *Madden*; Simla, 6000–8000 ped.! *T. T.* (fl. temp. pluv.). (v.v.)

Herba 3-pedalis. *Folia* membranacea, alterna, basi interdum glanduloso-setigera, petiolo basi glandulis magnis non stipulata, sed interdum caulis infra petiolum linea glandularum nigrarum instructa est. *Pedunculi* 3-5″, 6–14-flori. *Pedicelli* graciles, ½″. *Flores* pallide purpurei v. violacei, interdum sordidi? *Capsula* linearis, gracilis, ¾″, oligosperma.

Very similar indeed to *I. leptoceras*, and probably only a form of that plant; but distinguished by its shorter spur and usually lilac lateral petals. Most of my specimens have rounded lobes to the petals, but in one of Strachey and Winterbottom's the lower lobe terminates in a long subulate tail.

93. I. LEMANNI (*H. f. & T.*). Erecta, glabra, caule ramoso, ramis suboppositis, foliis longe petiolatis late ovatis obtusis obtuse dentatis, pedunculis elongatis apice flores 3–5 gerentibus, bracteis parvis late ovatis, floribus majusculis, sepalis late ovato-cordatis, vexillo hemisphærico, labello late infundibuliformi in calcar elongatum gracile incurvum abrupte attenuato, alis amplis.

Hab. Affghanistan solo arenoso prope Otipore! *Griffith*, 1251, *It. Not.* p. 346 (Herb. Lemann, et Bentham).

Species valde distincta, ob folia longe petiolata late ovata obtusa et obtuse sinuato-dentata (ut in *I. noli-tangere*) facile distinguenda. Exemplar solitarium annuum, spithamæum, ramosum. *Petioli* ½–1″, lamina 1″. *Pedunculi* graciles, foliis æquilongi. *Flores* rosei, conferti v. racemosi, pedicellis ½″, cum calcare 1–1½″ longi.—"Calcar fusco-rubrum, alis basin versus albis, limbo aurantiaco-maculatis."—*Griffith.*

This species belongs in habit and foliage to the group with *I. noli-tangere* and *fulva*, and has no very near ally in India.

94. I. GLAUCA (*H. f. & T.*). Elata, tota glauca, foliis longe petiolatis oblongo-cordatis grosse crenatis, pedunculis terminalibus lateralibusque fructiferis robustis elongatis 8–12-floris, pedicellis fructiferis robustis patulis, capsula lineari-clavata acuminata oligosperma.

Hab. Himalaya occidentali temperata; Kumaon ad Dwali, alt. 9500 ped.! *Strachey et Winterbottom.*

Species singularis (sed exemplar mancum) ubique pallide pruinoso-glauca. *Caulis* 3-pedalis, ramosus, crassitie digiti minoris. *Folia* 1–4-pollicaria membranacea, supra pallide viridia. *Pedunculi* fructiferi 6–10″. *Flores* ignoti. *Capsula* 1½″. *Semina* magna.

95. I. TUBERCULATA (*H. f. & T.*). Caule erecto ramoso, foliis 1–2″ breviuscule petiolatis elliptico-ovatis lanceolatisve utrinque acuminatis in petiolum angustatis grosse crenatis dentibus basi glandulosis, pedunculis brevibus terminalibus lateralibusque 4–8-floris, pedicellis brevibus, floribus sordide purpureis, sepalis falcatis, labello conico gibbo non calcarato, capsula brevi clavata verruculosa.

Hab. Himalaya orientali temperata et subalpina, Sikkim, alt. 10,000 13,000 ped.! *J. D. H.* (fl. Aug.–Sept.). (v.v.)

Herba robusta, 2 3-pedalis. *Folia* glandulis dentium versus apices interdum setigeris, nervis tenuibus valde divergentibus; glandulis nullis, v. interdum ad basin foliorum v. petiolo v. caule ad basin petiolo sessilibus v. stipitatis. *Flores* ⅓–½″ longi. *Capsula* papillis magnis subseriatis verruculosa, crassiuscula, ½″ longa.

96. I. BRACHYCENTRA (*Kar. & Kir.*). Caule elato ramoso gracili, foliis 3–5″ petiolatis membranaceis elliptico-lanceolatis utrinque acuminatis crenatis serratisve dentibus apice setuligeris, pedunculis numerosis terminalibus gracillimis multifloris, bracteis subulatis, pedicellis gracillimis, floribus pallidis minimis, sepalis parvis oblongo-lanceolatis, labelli sacco conico acuto, capsula lineari glaberrima acuminata oligosperma.

? I. elata, *Edgew. in Linn. Trans.* xx. 41.

Hab. Himalaya occidentali temperata, alt. 5000–9000 ped. a Kunawur! *Jacquemont T. T.*; ad Marri! *Fleming* (fl. Jun.). (v.v.).

Dist. Soongaria.

Herba 2–4-pedalis. *Folia* pallide viridia, nervis divergentibus tenuissimis, basi setoso-glandulosa v. nuda, petiolo interdum basi utrinque glandula cylindrica v. depressa instructa. *Pedunculi* 3–5″, stricti. *Pedicelli* 1″. *Flores* ¼″ longi. *Capsulæ* ¾″. *Semina* 3–6, oblonga, opaca, striata, sub lente lineis crebre rugulosis notata.

Very nearly allied to *I. parviflora*, DC., of Siberia, and perhaps only a short-spurred form of that plant. Edgeworth's specimens of *I. elata* in Herb. Benth. are imperfect, wanting the flower, but in habit, foliage, fruit, &c., they entirely accord with the *I. brachycentra*.

H. HYDROCERAS, *Blume*.

1. Hydroceras triflora, *W. & A. Prodr.* i. 140.

Impatiens angustifolia, *Blume.*—I. triflora. *L.*—I. natans, *Willd.*

Hab. Ubique in uliginosis, Bengaliæ! utriusque Peninsulæ! Ceyloniæ! et Birmæ! (fl. temp. pluv.). (v.v.)

Dist. Java!

POSTSCRIPT.—Lieut. R. H. Beddome, in his paper alluded to in the foot-note at p. 112, has described twelve additional Peninsular species from the Anamallay Hills, and given a synoptical table of all the Peninsular species, in which two more species, *I. phœnicea* and *I. Pulneyensis*, are briefly diagnosed. Lieut. Beddome's paper seems to be a very good one, and I have little difficulty in referring all his new species to the sections I have established; they are the following:—

§ A I. verrucosa. *Alæ* bilobæ, verrucosæ. *Calcar* elongatum.
Hab. Mont. Anamallay, alt. 5000–7000 ped.

I. crenata. *Alæ* bilobæ, cum fasciculo pilorum. *Vexillum* crenatum. *Calcar* breve.
Hab. Mont. Anamallay, alt. 5000 ped.

I. Akka. *Flores* magni. *Alæ* bilobæ, cum fasciculo pilorum. *Vexillum* integerrimum. *Calcar* breve.
Hab. Mont. Anamallay, alt. 7000–8000 ped.

I. tenuis. *Flores* parvi. *Alæ* bilobæ, pilosæ. *Vexillum* integerrimum. *Calcar* breve.
Hab. Mont. Anamallay, alt. 5000–7000 ped.

I. gracilis. *Alæ* integræ. *Calcar* elongatum.

§ B I. ligulata. *Alarum* lobus interior ligulatus. *Calcar* absconditum!
Hab. Sylvis, alt. 2000–3000 ped.

§ C I. viscosa. Erecta, ramosa. *Pedunculi* viscidi, 6–12-flores. *Calcar* curvum gibbum. *Semina* echinata.
Hab. Mont. Anamallay, alt. 3000–5000 ped.

I. Anamallayensis. *Folia* opposita, ramorum alterna. *Pedunculi* 6–8-flores. *Calcar* breve, rectum. *Semina* villosa.
Hab. Mont. Anamallay, alt. 5000–7000 ped.

I. Pulneyensis. *Bracteæ* glandula terminatæ. *Calcar* non gibbosum.
Hab. Mont. Pulney, alt. 8000 ped.

§ D I. parvifolia. *Folia* minuta, cuneata. *Pedunculi* axillares, solitarii, elongati.
Hab. Mont. Akka, alt. 8000 ped. (aff. *I. pendulæ*).

§ E I. parasitica. Omnia ut videtur *I. viridifloræ,* sed alarum lobus superior sub vexillo reconditus.
Hab. Mont. Anamallay, alt. 5000–6000 ped.
I. elegans. Erecta. *Calcar* 0. *Semina* pilosa.

§ F I. Tangachee. *Pedunculi* folia longe superantes, apice 4–8-flores. *Flores* minimi. *Calcar* gracile.

§ G I. Wightiana. Suffruticosa. *Folia* anguste lanceolata. *Pedunculi* solitarii, petiolum paullo excedentes, per totam longitudinem floriferi. *Calcar* breve, incurvum.
Hab. Mont. Anamallay, alt. 4500 ped.
I. phœnicea. *Calcar* apice inflatum.
Hab. Mont. Pulney, alt. 7000 ped.

Lieut. Beddome's paper supplies the following additional habitats and elevations to Peninsular species:—*I. scapiflora* attains 7000–8000 feet; *I. rivalis*, 3000 feet; *I. viscida* and *I. campanulata* ascend to 7000 feet; *I. maculata* grows on the Anamallays at 4500 feet.

I. filiformis is, according to Beddome, distinguished from *I. inconspicua* by the glabrous pedicels, and *I. cordata* from *I. viscida* by the peduncles not being viscid.

On the *Fumaria capreolata* of Britain.

By Charles C. Babington, Esq., M.A., F.R.S., F.L.S.

[Read November 17, 1859.]

It is several years since there was considerable discussion amongst those botanists who take an especial interest in the accurate determination of British plants, concerning a *Fumaria* which grows plentifully in the Channel Islands, Western Cornwall, and near to the coast of Wales. It was then determined by Mr. Mitten (Lond. Journ. of Botany, vii. 556) to be the *F. agraria* (Lag.), and I, confidently believing that that identification was correct, gave a tolerably full description of it (Bot. Gaz. i. 62) under that name. At the same time I referred some Azorean specimens, received from Mr. H. C. Watson, severally to the *F. agraria* (Lag.), *F. muralis* (Sond.), and *F. capreolata* var. *media* of Webb. Concerning this, Mr. Watson remarked that, "to his eyes, after examining scores of the Azorean *Fumarias*, living and dried, they seem all to belong to one species, and to be so little different, and so gradually dissimilar, as to be scarce worthy of separate names, even in the light of varieties only" (Phytol. iii. 805). As will shortly be seen, I now think that he was nearly, if not quite correct in those remarks. Opinions formed after the examination of only a few very imperfect specimens, and therefore little more than guesses, are never either conclusive or satisfactory. Mr. Watson's own view, which was founded upon scores of specimens examined when alive, is, of course, nearly conclusive against that formerly held by me. Of the three Azorean plants then noticed (Bot. Gaz. *l. c.* 63 & 64), two certainly do seem to belong to one species: the third (sent by Mr. T. C. Hunt from St. Michael's) looks far more like a form of the true *F. capreolata*; it is too incomplete for satisfactory determination. The two first-mentioned specimens I now refer to the *F. muralis* (Sond.) with some confidence; and if Mr. Hunt's broader-leaved plant is correctly joined to them, as was believed by Mr. Watson, we shall have arrived at the same result for the Azores that Mr. Lowe (Fl. Mad. 13) has done for Madeira, namely, that all the so-called *F. capreolata* of those islands is really the *F. muralis* of Sonder.

After reading Mr. Lowe's most valuable remarks (*l. c.*), I was led to re-examine my British specimens, in the hope of finding amongst them the *F. muralis*,—suspecting that my former *F. agraria*, which, in deference to the views of Dr. Walker-Arnott and Mr. Watson, I had ceased to regard as a species, might be rightly so named. Although the result is a little different from that expectation, all my supposed *F. agraria* proving to belong to the *F. confusa* (Jord.), nevertheless I find amongst plants received from Mr. Leighton examples of the *F. muralis*. This is the more interesting from Mr. Jordan's remark, made in the year 1848, concerning *F. muralis*. He said, "specimina hujus in Gallia lecta nondum vidi;" and as it is not noticed in the third edition of Boreau's valuable 'Flora of Central France,' nor in Lloyd's Flora of the West of that country, we may perhaps safely conclude that it has not even now been detected there. I possess an authentic specimen of *F. muralis* from Mr. Sonder himself, and another from the Island of Madeira, by which to determine the plant of Lowe. They accord very satisfactorily with each other and with the descriptions of the species as given by Sonder, Koch, A. Jordan, and Lowe.

These plants, together with *F. capreolata* (*F. speciosa*, Jord.), *F. pallidiflora* (Jord.), and *F. Boræi* (Jord.), combined with a few others which inhabit the regions bordering on the Mediterranean Sea, constitute the Section *Capreolatæ* of Hammar, in his 'Monographia Generis Fumariarum,' for a copy of which I am indebted to my celebrated friend Fries.

This group of *Fumarias* has long been the subject of discussion amongst botanists, and it still remains difficult to ascertain the characters considered as distinctive by the describers of the species; for the descriptions are scattered through various books, some of which are rarely to be met with, and being drawn up by writers holding different views concerning the value of characters, are often not of easy comparison. As early as the year 1839 Dr. Walker-Arnott (Edinb. Bot. Soc. Rep. iii. 106) described as varieties of *F. capreolata*, under the names of α. *australis*, β. *Reichenbachii*, and γ. *Anglica*, three plants (preferring to consider them "as well-marked varieties to separating them as ill-defined species"), which I believe to be the *F. speciosa*, *F. pallidiflora* (including *F. Boræi*), and *F. muralis* (perhaps including *F. confusa*) respectively. As Dr. Walker-Arnott had not noticed what I consider as the real distinctive characters of these plants, he exercised a sound judgment in calling them only varieties; but I rather wonder that in his editions of the 'British Flora' he does not mention them—even as such. The possession of authentic specimens, received from Mr. Leighton, enables me to identify Dr. Walker-Arnott's plants, and to award to him the credit of being apparently the first botanist to notice them. In 1841 Mr. Leighton (Fl. Shrop. 344) carefully described two forms of the supposed *F. capreolata*, and adds, that that which he distinguishes from the type of the species "merits attention and further remark," which, however, he does not seem ever to have given to it. His supposed type of *F. capreolata* I believe to be the *F. muralis*, Sond., and his second form is the *F. Boræi* (Jord.) and the *F. capreolata* β. *Leightonii* of my 'Manual.' Mr. Sonder (Koch, Syn. ed. 2. 1017) described his *F. muralis* in 1844; Mr. Jordan his *F. confusa* in 1848 (Cat. Dij. 18), his *F. Boræi* in 1849 (Cat. Gren. 15), his *F. speciosa* in the same year (Cat. Gren. 15), and his *F. pallidiflora* (Schultz, Arch. 305) in 1854.

Before proceeding to define the characters of these plants, care must be taken that the species allied to *F. agraria* (Lag.) are separated from the true *Capreolatæ*. They all have very markedly tubercular-rugose fruit,—a rugosity very different from the slightly rough (dry) fruit of some of our plants. None of them have been found in Britain, the climate of which is too cold for them.

Those of the *Capreolatæ* which it is necessary to consider on this occasion are the following: *F. pallidiflora*, *F. Boræi*, and *F. confusa* of Jordan, and *F. muralis* of Sonder. All of these appear to inhabit Britain, and they are also found in the neighbouring parts of Europe. Their fruit is nearly, although not always, entirely smooth. It is chiefly when the fruit is quite dry that a slight roughness may be occasionally detected; but, as was remarked above, in no case do they acquire the tubercular-rugose coat of the plants grouped as the *Agrariæ*.

Mr. A. Jordan appears to have been the first to point out a most valuable character which distinguishes one of these species, the *F. confusa*, in a remarkable manner, and which is applicable also to the others, although less conspicuously. The base of the fruit is furnished with a fleshy mass by which it is attached to the pedicel. The size and relative proportion of this mass (which may be called the *base*) to the fruit itself, and to the enlarged tip of the pedicel, can only be seen when the fruit is fresh (although it may be restored tolerably completely by softening the specimens in boiling water), and has therefore been overlooked by botanists. In *F. confusa* this *base* is so large as to be very nearly as broad as the broadest part of the fruit, and exceeds in width the slightly enlarged tip of the pedicel. In *F. Boræi* it is very narrow and nearly as long as broad, forming a kind of stalk to the fruit. It is much narrower than the rather remarkably enlarged tip of the pedicel. In *F. pallidiflora* the tip of the pedicel is not much enlarged, and very slightly exceeds in width the base of the fruit, which seems to be rather broader, but at the same time rather shorter and less conspicuous than that of *F. Boræi*. In *F. muralis* the tip of the pedicel is enlarged and is rather thicker than the base of the fruit, which is not nearly so broad nor so conspicuous as that of *F. confusa*. It widens gradually upwards, so as to give to the whole fruit a pyriform shape when fresh,—the line of separation between the true carpel and the "base" being only faintly marked. In *F. confusa* the limits of these parts are clearly defined.

There is a character furnished by the little pits at the top of the fruit (one pit being placed upon each side of the base of the style) which is probably of value. They are not very conspicuous on the fresh fruit, but show themselves obviously after its outer coat has shrunk in drying. In *F. pallidiflora* and *F. Boræi* these pits are small, deep, and nearly round; in *F. confusa* they are broad and shallow; in *F. muralis* they are usually so very shallow as often to be scarcely visible.

The size of the fruit separates *F. muralis* from its allies: it is much smaller and also much rounder. The other species now under consideration have fruits all very nearly equal in size, although differing in form.

There is a curious spur attached to, and apparently forming a continuation backwards of, the agglutinated filaments of the upper cluster of stamens. It is directed backwards into the spur of the upper petal, and may possibly furnish characters by which to assist in distinguishing species. I believe that the credit of first calling attention to it belongs to Parlatore, who describes and figures it in his 'Monografia.' My acquaintance with it is very slight, my attention having only recently been directed to it. If we may judge from books, few botanists appear to know of its existence.

I have failed in detecting any constant characters in the leaves, the forms and sizes of which are very variable. Neither does the erect or rampant or prostrate state of the stem seem to be of much consequence. When writing about *F. confusa* (my *F. agraria*) in the 'Botanical Gazette,' I remarked that the stem was erect in the earlier, and procumbent in the later part of the summer. Such I suspect to be also the case in the other plants now under consideration.

The differences which are found in the forms and proportions of the sepals and of the bracts will be noticed under the several species, as will be also the colour of the corolla and the direction of the fruit-bearing pedicels.

The only British plant which can be confounded with these *Capreolatæ* is the diffuse state of *F. officinalis*. It is perhaps often called *F. capreolata* by careless observers; and its being distributed by them with that name has tended to confuse the ideas of better botanists who have only had the dried specimens before them. Amongst nearly allied and similar-looking plants, it is often better to append no name to a specimen than to risk the application of a wrong one. This rampant form of *F. officinalis* agrees in nearly all respects with the erect and typical form of that species. Its spikes of fruit are very long and lax; its fruits are obovate-retuse, with a very faintly marked base and decidedly rugose surface; its lower petal is spathulate, being linear with the exception of a round dilatation at the end. As far as I am able to ascertain, the spikes of all these *Capreolatæ* are always much shorter; their fruits are never retuse, have always a marked base, and a surface which is not rugose, although sometimes slightly rough when dry; their lower petal is not spathulate, but widens gradually throughout its upper half.

Dr. Walker-Arnott has shown (Edinb. Bot. Soc. Rep. iii. 99) that the typical *F. capreolata* (Linn.) is the plant found at Montpellier (the *F. speciosa* of Jordan). It is exceedingly beautiful, and has larger flowers than those of *F. pallidiflora*. Its corolla is white, but tinged reddish on the back and with a brownish-black tip. The pedicels are turned downwards, "parallel to the peduncle, almost from their point of insertion, and this before the flowers have fallen off, so that the spur of the flower is superior, the apex pointing downwards," to adopt his accurate words. The fruit is much smaller than that of *F. pallidiflora*, and closely resembles in size and form that of *F. muralis*, except that it is *not* "equally rounded at the top as elsewhere," but is slightly truncate; the apical pits also are small but deep. It seems to be quite a distinct species from either of those described in this paper, and is chiefly found in the South of Europe. Linnæus adopted it primarily from Bauhin, and DeCandolle ascertained that the plant found at Montpellier is that of Bauhin. I have a specimen of the *F. capreolata* (*F. speciosa*, Jord.) gathered at DeCandolle's station by Sonder. Linnæus also quotes Ray's 'Historia' (405) to his plant, and therefore gives England as a locality for it; but Ray's plant is certainly not that of DeCandolle, which is apparently as certainly that of Linnæus, who does not seem to have known it practically, but adopted it from his predecessors.

Some excellent botanists will doubtless say that these plants are all forms of one variable species, and I suppose that no person is in a position to contradict them; for who knows what really constitutes a species amongst plants? It seems to me to be just as impossible to prove that the "aggregate species," as Mr. Watson terms them, are quite distinct from each other, as it is to show that the "segregate species" are so. The difference between my views and those of my eminent friends referred to above amounts only to this, that they think that by a study of the aggregate species they best advance our knowledge of the vegetable creation, whilst I consider a discrimination of the segregate species to tend at least as greatly to that end. The search after truth is our common object, and, although we may be far from having yet attained to it, we all confidently hope that our accurate and honest endeavours will assist our successors in its discovery.

1. F. PALLIDIFLORA (*Jord.*): sepalis ovatis dentatis corollam dimidiam longitudine fere æquantibus ejusque tubum latitudine superan-

tibus, *fructibus* subgloboso-compressis obtusis *longioribus quam latis* lævibus, *basi fructus brevi pedicelli apice angustiore*, bracteis *pedicellos* floriferos excedentibus *fructiferis reflexis* paulo brevioribus, racemis evolutis laxis brevibus paucifloris.

F. pallidiflora, *Jord. in Schultz, Arch.* 305 ; *Bor. Fl. du Centre de la Fr.* ed. 3. ii. 34.

F. capreolata, *Hamm. Mon. Fum.* 24. t. 3 (excl. var. *a* et *β*).

Sepals soon falling, usually entire towards the point, as broad as or broader than the cor.-tube. Cor. large, cream-coloured, tipped with red or pink ; tube thick ; lower petal linear, green, boat-shaped, gradually dilated towards the end, its sides inflexed ; lateral petals linear, truncate-apiculate, with a narrow keel. Fruit with a short and rather narrow base which is very nearly as broad as the thickened tip of the pedicel ; edge not regularly rounded, but the whole vertical outline rather quadrangular ; apical pits small and deep. Fruit-stalks usually curved back, but sometimes only patent or divaricate.

The *F. capreolata β. Reichenbachii* of Arnott (Rep. Edinb. Bot. Soc. iii. 106) includes this plant and *F. Borœi*, as I learn from specimens named by Dr. Arnott for Mr. Leighton.

The fruit of my plant is always longer than broad, and its base has little of the stalk-like character of that of its nearest ally, *F. Borœi*, from which also its paler flowers and recurved fruit-stalks seem to distinguish it.

As the typical *F. capreolata* (Linn.) is the *F. speciosa* (Jord.), that name must disappear from our flora.

I have seen specimens of this plant from Salcombe and Ilfracombe, Devon ; Watchet, Somerset (Rev. W. W. Newbould) ; Oystermouth near Swansea, Glamorgan ; Caernarvon ; Oswestry, Shropshire.

2. F. **Boræi** (*Jord.*) : sepalis late ovatis dentatis tubi corollæ latitudine latioribus eodemque ⅓ brevioribus, *fructibus* subgloboso-compressis *truncatis latioribus quam longis* demum paulisper rugulosis, *basi fructus angusta pedicellique apicem haud superante*, bracteis sæpe pedicellos floriferos paulo excedentibus *fructiferis patentibus* brevioribus, racemis evolutis laxis brevibus paucifloris.

F. Boræi, *Jord.* ! "*Cat. Grenob.* 1849, 15 ;" *Pugil.* 4. *Lloyd, Fl. Ouest France*, 24. *Bor. Fl. Cent. France*, ed. 3. ii. 34. *Billot, Exsic.* No. 2209.

F. capreolata, *Curt. Fl. Lond.* ii. 145 (fasc. vi. 47) ; *Koch in Sturm, Deutschl. Fl.* 62. 13.

F. capreolata *β.* Leightonii, *Bab.* ! *Man.* ed. 4. 17.

F. capreolata (second form), *Leight.* ! *Fl. Shrop.* 345.

F. media *a.* typica, *Hamm.* 28. t. 3.
F. muralis, *Bor. Fl. Cent. Fr.* ed. 2, not *Sond.*

Sep. soon falling, attached above their base, deeply toothed at the base, often toothed throughout. Cor. rather large, pale, often purplish, with a dark purple tip; pet. gradually narrowed to an acute point at the tip; lower petal often free and either patent or declining. Fruit with a narrow base, which is usually, perhaps always, much narrower than the enlarged tip of the pedicel. The vertical outline is rather quadrangular with the sides rounded and top truncate; apical pits small and deep. Fruit-stalks patent, straight, or rarely slightly deflexed.

This is probably the *F. capreolata* of Smith, under which name Mr. A. Jordan received it from Sir W. J. Hooker (Archiv, 305). It is certainly the *F. capreolata* of Curtis's beautiful plate in the 'Flora Londinensis.' Sowerby's plate in 'English Botany' is probably taken from a specimen of *F. Boræi*, but may contain some traces of *F. muralis*. A minute examination shows that the drawing is not trustworthy.

The specimen from Winandermere, with long bracts, referred to *F. capreolata* in my paper published in the first volume of the Edinburgh Botanic Society's Transactions, is a state of *F. Boræi*.

Lloyd (Fl. Ouest) describes the fruit of his *F. Boræi* as "un peu plus long que large." It seems therefore probable that he may include the *F. pallidiflora* under that name. The fruit of my plant seems to be always rather broader than long, and is remarkable for the squareness of its vertical outline and the stalk-like appearance of its base: approaching in form to that of *F. officinalis*; but it is not so short relatively to its breadth, nor retuse. Its racemes are few-flowered and short, thus differing greatly from the long and many-flowered ones of *F. officinalis*.

F. Boræi is perhaps too nearly allied to *F. pallidiflora*; at least such seems to be the case when dried specimens are examined. Its leaflets appear to be narrower relatively to their breadth. The corolla is always much tinged with pink, which is rarely the case with those of its ally. Its sepals are usually more toothed, and are generally larger. Its fruit is different in shape; the base is broader, but still not so broad as the tip of the pedicel, although that part is less enlarged than in *F. pallidiflora*.

I have seen *F. Boræi* from Tenby, Pembrokeshire; Shrewsbury; Windermere, Lancashire; Glenmore near Lisburn, co. Antrim (Dr. J. H. Davies).

3. **F. CONFUSA** (*Jord.*) : sepalis ovatis apiculatis dentatis tubi corollæ latitudinem æquantibus eodemque $\frac{2}{3}$ brevioribus, fructibus subgloboso-compressis apice rotundatis demum paulisper rugulosis, *basi fructus latissima pedicelli apice conspicue latiore*, bracteis pedicellos floriferos æquantibus *fructiferis patentibus* duplo brevioribus, racemis evolutis laxis brevibus paucifloris.

F. confusa, *Jord. Cat. Dij.* 1848, 18; *Lloyd, Fl. Ouest Fr.* 24.
F. Bastardi, *Bor.* "*in Rev. Bot.* ii. 359"; *Fl. Cent. Fr.* ed. 3. ii. 34.
F. agraria, *Mitt.*! *in Lond. Journ. Bot.* vii. 556; *Bab.*! *in Bot. Gaz.* i. 62 (not *Lag.*).
F. capreolata, *Bab.*! *Prim. Fl. Sarn.* 4.
F. capreolata γ. media, *Bab.*! *Man.* ed. 4. 17.
F. media β. confusa, *Hamm.* 28. t. 3.

Sep. often persistent with the young fruit. Cor. rather large, but less than that of *F. pallidiflora*, dingy white or pinkish; tip and sometimes the back dark purple; tube rather thick; lower petal linear, flattened, blunt, keeled and brownish, and with inflexed sides towards the tip; lateral petals linear, truncate-apiculate, broadly but shortly boat-shaped, winged on the back. Young fruit rather obovate-acuminate. The fleshy base is nearly as broad as the fruit, and wider than the much-enlarged tip of the pedicel: it is scarcely narrower at its base than where it joins the fruit. The vertical edge of the fruit is regularly rounded, and the whole outline, above the enlarged base, is nearly round; apical pits broad but shallow.

If attention be paid to the shape of the fruit, and especially to its remarkable base, there cannot be any difficulty in distinguishing this plant from *F. pallidiflora* and *F. Boræi*; neither does it seem probable that any botanist who examines them when fresh will have doubts about the specific distinctness of this plant from its allies.

Had I possessed the acuteness of observation which belongs to Mr. Jordan, I should not have been misled into reducing this plant to a form of *F. capreolata*, after having recorded it as a species, although with an erroneous name. The effect of my so acting has been what is usual in such cases, viz. that the plant has suffered total neglect in this country. There seems to be no surer mode of diverting attention from a plant than that of placing it as a variety of some species supposed to be well known.

I have seen specimens of this plant from Jersey and Guernsey; Zennor and Trevenna, Cornwall; Ilfracombe, Devon; Tenby, Pembrokeshire; Aberystwith, Cardiganshire; Bangor, Caernarvonshire; Hawkhead, Lancashire; and Dublin.

4. F. MURALIS (*Sond.*): sepalis ovatis acutis basi dentatis tubi corollæ latitudinem subæquantibus eodemque $\frac{2}{3}$ brevioribus, fructibus obovato-compressis apice rotundatis parvis sublævibus, *basi fructus lata obconica pedicelli apice paulo angustiore*, bracteis pedicellos floriferos æquantibus *fructiferis erecto-patentibus* brevioribus, racemis evolutis laxis brevibus paucifloris.

F. muralis, *Sond.*! *in Koch, Syn.* ed. 2. 1017; *Fl. Hamb.* 385. *Jord. Cat. Dij.* 1848, 19. *Lowe*! *Fl. Madeira,* 13. *Fries, Summa,* 146; *Fl. Dan.* t. 2473.
F. Petteri, *Koch, Syn.* ed. 2. 435 (not *Reichenb.*).
F. capreolata var. media, *Fries, Mant.* iii. 88.
F. capreolata (type), *Leight.*! *Fl. Shrop.* 344.
F. media γ. muralis, *Hamm.* 29. t. 4.

Plant usually more lax than its allies. Corolla smaller than that of *F. confusa*, tipped "dark atro-purpureous or black." Petals abruptly apiculate. The fleshy base is not nearly so broad as the fruit, and narrows very conspicuously from above downwards to the pedicel, the tip of which slightly exceeds it in width. The fruit, together with its base, has thus, when fresh, an obovate or nearly pyriform outline; it is equally rounded at the top as elsewhere, and neither pointed nor retuse, as is well remarked by Mr. Lowe; the apical pits are usually so very slightly impressed as almost to escape notice. The bracts are often not more than half as long as the fruit-stalks.

Fries seems to include under his *F. muralis* the plant of Sonder and also the *F. confusa* of Jordan; for he states (Mant. iii. 88) that it is the *F. capreolata* of Eng. Bot. (t. 943), and says of it, "Galliæ occidentali, Britanniæ præcipue boreali et Norwegiæ extimis oris propria videtur." The plant of Western France is certainly the *F. confusa*. What the Norwegian plant may be is unknown to me, for I have not seen a specimen; but as it is found "Norwegiæ maxime occidentalis," it may well be the true plant.

This is probably the type of the *F. capreolata* γ. *Anglica* (Arn.), which is considered as the true *F. capreolata* by Leighton. A considerable series of Leighton's specimens is before me, some of which were named (γ. *Anglica*) by Arnott. But, apparently, Arnott included the *F. confusa*, and perhaps *F. Boræi*, in that variety. Leighton seems to have inclined towards the opinion that his two forms of *F. capreolata* were distinct species, as is the fact. To him therefore is due the credit of first discriminating between *F. Boræi* and *F. muralis* in this country, although he refrained from naming the new species, and was unacquainted with the most valuable characters by which they are distinguished from each other and from their allies.

I have seen *F. muralis* from Barnes, Surrey (Mr. Pamplin); Shrewsbury, Salop; Wrexham, Denbighshire (J. E. Bowman); Sheffield (Rev. W. W. Newbould).

Having now characterized all our species belonging to the group called *Capreolatæ*, it may be well to add a similar notice of the true *F. capreolata* (Linn.), derived from specimens received from several parts of the South of Europe, and especially from some gathered by Mr. Sonder at Montpellier, in the place pointed out by DeCandolle.

F. CAPREOLATA (*Linn.*): sepalis ovatis basi dentatis tubi corollæ latitudine latioribus eodemque duplo brevioribus, *fructibus obovato*-compressis obtusis parvis longioribus quam latis lævibus, basi fructus lata obconica pedicelli apicem æquante, bracteis *pedicellis floriferis et fructiferis reflexis* brevioribus, racemis evolutis laxis brevibus paucifloris.

F. capreolata, *Linn. Sp. Pl.* 985. *DeCand. Syst.* ii. 133; *Fl. Fr.* iv. 639; *Prod.* i. 130.

F. speciosa, *Jord.* "*Cat. Gren.* 1849, 15;" *in Schultz, Arch.* 199; *in Walp. Ann. Bot.* ii. 28. *Lloyd, Fl. Ouest*, 24. *Bor. Fl. Cent.* ii. 34.

Sepals persistent, often even found with the fruit, usually entire in their upper half. Cor. very large, white, tipped with brown-black. Fruit half as large as that of *F. pallidiflora*. Base of the fruit not nearly so broad as the fruit and narrowing downwards to its point of attachment. The whole fresh fruit is rather pyriform, quite smooth; its apical pits conspicuous.

On *Combretum butyrosum*, a new kind of Butter-tree from South-eastern Africa. By T. Caruel of Florence. Communicated by J. D. Hooker, M.D., F.R.S. & L.S.

[Read Nov. 17th, 1859.]

Several years ago Professor Joseph Bertoloni published an account of a kind of vegetable butter, which he had received from South-eastern Africa together with dried specimens of the tree that produced it. This tree Professor Bertoloni considered as belonging to a new genus, which he consequently described under the name of *Sheadendron*, and called the plant *S. butyrosum*, from an idea that it was the same as the celebrated Shea-tree mentioned by Mungo Park. According to him, the *Sheadendron* could not belong to any of the known orders of plants, but ought probably to constitute a new order of *Sheæ*, in the neighbourhood of *Myrtaceæ*.

Owing to the liberality of the learned Professor, who sent specimens of the plant, both in flower and fruit, to the Central Herbarium in Florence, I have been able to examine it more closely, and the result of my inspection has been to confirm a suspicion that had arisen in my mind, at first sight of the plant, that it was a *Combretacea*. In fact, I consider it as a true *Combretum*, from which it differs in no respect but in having an apterous fruit—a character by no means sufficient, I should think, to constitute it as a distinct genus, much more so as we see in the same order another genus (*Terminalia*) with winged or wingless fruits. The blossoms and the general habit are entirely those of a *Combretum*. The following description of the plant (which I shall call *Combretum butyrosum*) will, I hope, satisfy my readers as to the accuracy of the view I have taken of the subject.

COMBRETUM BUTYROSUM, *Car. MSS.* (*Sheadendron butyrosum*, Bert.! Illustr. di Pianti Mozambicesi, dissert. 1^a, p. 12, f. 4, where the analyses of the flower are partly incorrect, the ovules of the inferior ovary being taken for a free ovary, &c.; Walp. Ann. Bot. Syst. iii. 861).—Arbor. Rami tenues, incurvi, teretes, juniores pube rufa adpressa villosi, dein glabrati cortice tenui griseo facile scindibili. Folia opposita, exstipulata, brevissime petiolata, petiolo villoso, elliptica, integerrima, margine tantulum recurvato, basi subcordata, apice cuspide brevi apiculata, reticulato-nervosa, nervis subtus prominentibus, $\frac{1}{2}$–1 decim. longa, dura, supra lævia glabra, subtus pallidiora glandulisque exiguis crebre punctata. Spicæ (ut videtur indeterminatæ) multifloræ, densæ, breves, pedunculo brevi vel longiusculo stipitatæ, paucæ (ad summum 5) oppositæ vel alternæ in ramulis ex axilla foliorum ortis, quæcunque basi suffulta bractea lanceolata caduca. Flores erecto-patentes, sessiles, bracteola filiformi breviuscula comitati. Calyx obconicus, 8^{mm} longus, tubo brevissimo, cum ovario connato, villoso, limbo glabrescente, glanduloso, fauce parum ampliata, 4-dentata, dentibus brevibus, triangulis, barbatis, præfloratione valvatis. Petala 4, parva (1$\frac{1}{2}^{mm}$ longa), ad summam faucem inserta, cum dentibus calycinis alternantia, cuneata, truncata, apice eroso-dentata. Stamina 8, 4 cum petalis alternantia supra medium limbi calycini inserta, breviter exserta, 4 autem petalis opposita sub ore inserta, longe exserta. Filamenta filiformia, apice subulata, glabra, staminum omnium æquilonga, ante anthesin incurvata. Antheræ parvæ, ovales, medio dorsi insertæ, utrinque emarginatæ, introrsæ, longitudinaliter dehiscentes, deciduæ, in sicco ochroleucæ. Pollen (in aqua) globosum, poris ut videtur tribus donatum. Ovarium inferum, uniloculare, biovulatum, ovulis ex apice loculi pendulis, anatropis, raphe introrsa. Stylus simplex, filiformis, glaber, longe exsertus, in alabastro vario modo curvatus, stigmate simplici. Fructus fere magnitudinis nucis myristicæ, 1–2 in quoque pedunculo, ovales, acuti, tomentosuli, 4-sulcati, sulcis fundo rugosis, pericarpio ligneo, in valvis 4 partibili. Semen unicum, totum loculum fructus implens, substantia interna meandriformi, in sicco inextricabili.—(v. s. sp.)

Hab. In Africa austro-orientali, et verisimiliter provincia Caffrorum.

According to the information gathered by Professor Bertoloni, the butter produced by this tree is called *Chiquito* by the Caffres, and commonly used to dress their victuals; it is also carried to the coast of Mozambique as an article of commerce. It is white, and rather hard, with a peculiar aromatic odour, which may be traced to the fruit and its kernel from which it is obtained. Its chemical composition is—Olein 25, Margarin 75=100.

I cannot agree with Professor Bertoloni in the opinion that our *Combretum butyrosum* is the same as the Shea-tree of Mungo Park, as such an opinion is grounded on no other fact than that both are from Africa and produce a kind of vegetable butter. The figure given in the first Voyage of Mungo Park of the Shea-tree is of a plant far different from our *Combretum*, with its elliptical-oblong, slightly obovate, obtuse leaves, with rather long foot-stalks, alternate and clustered in close spirals at the top of the branches. The fruit also is different. Nor is there any reason to believe with Professor Bertoloni that the figure was drawn by mistake from some other plant. Mungo Park referred the Shea to the order *Sapotaceæ*, and it seems rightly, as it has been subsequently described by G. Don as a kind of *Bassia* (*B. Parkii*).

Descriptions of New Species of *Utricularia* from South America, with Notes upon the Genera *Polypompholyx* and *Akentra*. By Daniel Oliver, jun., F.L.S. (With a Plate.)

[Read Nov. 17, 1859.]

I FURNISH, in the first place, a description, with an excellent figure by Mr. Fitch, of a new and remarkable epiphytical *Utricularia* sent recently by Professor Jameson of Quito to Sir William J. Hooker.

UTRICULARIA, *L.* (Sect. *Orchidioides*, A. D.C.)

U. JAMESONIANA. Scapo gracili (2–3-pollicari) 1–2-floro, folio basi ejus lineari-lanceolato v. lanceolato-spathulato, corollæ labio

superiore amplo late ovato integro obtusissimo calycis lobum superiorem integrum ovatum obtusum superante, labio inferiore antice 3-lobato lobis obtusis integris v. centrali emarginato, calcari basi saccato-conico ultra porrecto cylindrico apice acutato calycis lobum inferiorem 2–3-plo excedente.

Ad fluvium Cosanga, Prov. Ecuador, legit Prof. Jameson.

U. rhizomate gracili ad truncos arborum repente, ad scapum et folium unicum etiam e nodis fibrillas tenues utriculiferas cum ceterisque paucis incrassatis tuberculatis emittente. *Folia* semper e basi scaporum ut videtur solitaria acuta v. obtusiuscula glabra in petiolum gracillimum attenuata. *Scapus* glaber interdum foliolis v. squamis 1–2 parvis lineari-lanceolatis basifixis instructus. *Bractea* lanceolata v. ovato-lanceolata bracteolis geminatis angustioribus æquilonga, omnes basifixæ et quam pedicellus breviores. *Calyx* lobis fere æqualibus glabris ovatis v. vix subcordatis, obtusissimis v. lobo inferiore leviter emarginato. *Corolla* purpurea (Jameson, *in lit.*) labio superiore pro planta magno verosimiliter nonnunquam apice abrupte obtuso, labio inferiore calcari breviore: calcar apicem versus pilis sparse obsitum. *Ovarium* tempore florifero in stylo crasso brevi sed fere æquilongo continuum. Capsulam maturam haud vidi.

Folia 6–10 lin. longa, 1–1½ lin. lata. Bractea 3–3½ lin. longa. A basi calycis ad extremum calcaris 6–8 lin. (Tab. I. fig. 1. Planta magnitudine naturali. *a, a.* flores integri; *b,* pistillum; *c,* folia; *d,* ampullæ sub lente auctæ, et *e,* eædem nascentes.)

Much smaller and more slender than *Utricularia unifolia*, Ruiz and Pavon, and *U. montana*, Jacq.*; differing also essentially in the spur, which exceeds the calyx, the three-lobed lip of the corolla, and other characters.

In enumerating the species of *Utricularia* collected by Richard Spruce, I desire to acknowledge the valuable aid afforded to me by the careful notes upon the plants in the fresh state, which, in accordance with the practice of that excellent botanist, accompany the specimens sent home by him. Comparatively few of them have been collected in sufficient quantity to supply the whole of his subscribers; and of some the specimens have been too much injured, or are otherwise insufficient, for accurate determination. Had the sections of the genus adopted by Benjamin, in his Monograph of the Brazilian species in the 'Flora' of Von Martius, recommended themselves to me as of practical use to botanists, I should probably have arranged these plants in accordance with them: some of these sections, based upon the presence or absence of ampullæ and of leaves at the time of flowering, are calculated to mislead.

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* I am not aware that a specific difference exists between these plants.

No. 194. *Utricularia pallens*, St. Hilaire. Para coll.

No. 444. „ „ „ Santarem.

No. 1071. *U. Parkeriana*?, A. DC. Santarem. This plant is allied to the foregoing, but differs in its longer, cylindrico-subulate, adpressed, obtuse spur which exceeds the lower lip of the corolla. The specimens are scarcely in a condition to be determined without doubt.

No. 310. Santarem.
No. 963. South shore of Amazon. } *U. foliosa*, L.
No. 1611. Manaquiry.

Seeds about 20–24, flattened, peltate, girt with an obtusely polygonal, narrow, submembranaceous wing. I take *U. oligosperma*, St. Hil., to be the same species, as also the *U. vulgaris* figured in Flor. Flum. (tab. 44), and quoted by St. Hilaire and Girard (Monog. Prim. et Lent. p. 21) as representing their plant. Are not these forms of our *U. vulgaris*, L.?

No. 1053. *U. quinqueradiata* (Spruce's MSS.). Santarem.—I regard this as a small form of the *U. inflata*, Walt., of the North American continent. Specimens from Florida (Rugel, coll.), labelled *U. inflata*, var. *minor*, do not seem different.

No. 1041^2. An *U. purpureæ*, Walt., varietas? *U. myriocista*?, St. Hil. Santarem.—Corollæ albæ (margine purpurascente) labium superius rotundatum integrum, l. inferius amplum trilobatum lobis obtusissimis, calcar conico-cylindricum obtusum quam labium parum brevius. *U. palatina*, Web. MSS. (in Hb. Hook. vidi) ad eandem accedit.

No. 1044. Santarem, and

No. 2986. San Carlos. *U. longeciliata*, A. DC. (Prodr. viii. p. 23). *Polypompholyx laciniata*, Benjamin (in Linnæa, xx. pp. 316, 496, and Flor. Bras. *Utriculariæ*, p. 251).

Collected also by Gardner, Hostmann, and others in Brazil and Guiana. Benjamin errs in referring this plant to the Australian genus *Polypompholyx*, established by Lehmann (Nov. stirp. Pugill. viii. p. 48), the *Tetralobus* of A. DeCandolle (Prodr. viii. p. 667). The calyx of *Utricularia* is constantly diphyllous. In the true *Polypompholyx*, in addition to the anterior and posterior calycine segments, common also to *Utricularia*, we find a pair of opposite, lateral, and somewhat smaller lobes within the former. Minute lateral bracteoles with the usual subtending bract, as in numerous species of the allied genus, are also found at the base of the pedicel. It is upon the quadripartite calyx alone that the genus depends; in other respects it is, I believe, quite a *Utricularia*.

In *U. longeciliata* the lateral bracteoles, which are rather largely developed, are not, as is usual, attached immediately by the bract, but spring from the very short pedicel at a small yet clearly marked interval beneath the true calyx-segments, towards which they are, of course, laterally disposed. Benjamin has erroneously regarded these bracteoles as forming part of the calyx, and indeed figures them as such in the 'Flora Brasiliensis.' It is undoubtedly a true *Utricularia*. A. DeCandolle, in describing the plant (Prodr. viii. 23), expressly states, ". . . bracteolis 2 majoribus flori adpressis;" and in the description of *U. fimbriata*, H. B. K. (Nov. Gen. et Sp. ii. 225), which I think the same species, we also find a correct view has been taken of these appendages:—"Pedunculi basi instructi bracteola ovata dentato-ciliata adpressa. Bracteæ duæ sub quoque flore, oppositæ, ovatæ, dentato-ciliatæ," &c. If an examination of the specimens of Humboldt and Bonpland confirm this presumed identity, their name must necessarily take precedence.

No. 1042. *Utricularia viscosa* (Spruce). Scapo (2–4-unciali) 2–6-floro viscoso, squamis parvis basi-solutis, calycis lobis subæqualibus rotundatis, corollæ albæ labio superiore rotundato integro lobo calycis fere duplo majore, calcari conico-cylindrico obtusissimo deinde curvato-porrecto corollæ labium inferius galeatum indivisum parum excedente, pedicellis fructiferis erectis, capsula globosa calycem superante. Santarem, floret mens. viii.

Folia non vidi. *Scapus* (fide Sched. Spr.) valde glutinosus, squamis ovato- v. lanceolato-rhomboideis utrinque plus minus acutis v. obtusiusculis. *Pedicellus* infimus adscendens 4–6 lineas longus. *Corolla* alba, labio superiore lineis purpureis notato, palato flavescente. *Semina* minuta, numerosa, rotundata v. elliptica, areolato-reticulata. Ab filamentorum insertione ad apicem calcaris circiter 2 lineas.

No. 2569. *U. peltata* (Spr.). Foliis orbiculatis peltatis, scapo hirtiusculo (2–4 unciali) 2–4–5 floro, squamis minutissimis basifixis, pedicellis calycem æquantibus, calycis lobis æqualibus ovatis, corollæ labio superiore obovato-oblongo integro calycem superante, calcari porrecto conico-cylindrico obtusiusculo corollæ labio inferiore integro rotundato fere duplo longiore. Prope Panurè. Floret mense ix. (Tab. I. fig. 2. Planta mag. nat. *a, a.* Flores a facie latereque visi; *b, b.* folia peltata; *c,* radicis fibrilla utriculifera; *d,* ampulla magnitudine aucta.)

Folia per florescentiam persistentia numerosa, margine integra v. leviter crenulata, diametro 1–3 lin., petiolis gracilibus cum fibrillis paucis utriculiferis interdum instructis. *Bracteæ* basifixæ ovatæ v. lanceolatæ bracteolis lanceolatis æquilongæ. *Calyx* hirtiusculus, lobo superiore acuto, inferiore minute emarginato. *Corolla* purpureo-cærulescens palatum versus albescit, labio superiore infra angustato, inferiore basin calcaris amplectente. *Stylus* brevis sed primum ova-

rium fere æquans. A basi calycis ad extremum corollæ calcaris circa 3 lineas.

A remarkable little plant, forming patches one to two feet in diameter in a sandy islet in the Falls of Panurè. Sufficiently distinct in its peltate orbicular leaves from all the smaller species with which I am acquainted.

No. 1050. *U. Spruceana* (Benth.). Scapo 1½–3 unciali unifloro, pedicello e bractea marginibus ejus in vaginam parvulam infundibuliformem connatis, calycis lobis rotundatis integris, corollæ labio superiore oblongo emarginato v. retuso calycem fere duplo superante, labio inferiore antice leviter retuso v. subintegro, calcari crasso obtuso dependente v. paululo curvato labium corollæ inferius æquante v. parum excedente. Santarem.

Scapus gracilis esquamatus basi fibrillis radiciformibus utriculiferis, foliis in spec. nostris ut videtur tempore florifero desunt, bractea involucriformi basi in scapo continua margine supra leviter bilobata. *Calyx* lobis fere æqualibus obtusissimis, inferiore quam calcar 2–3-plo breviore. *Corolla* alba, fauce macula flava notata. *Stylus* primum ovarium fere æquans. A basi calycis ad extremum calcaris corollæ 1½–2 lin.

The singular, minute, sheath-like involucre may perhaps result from confluent bract and bracteolæ. Spruce sent it over under the MS. name of *U. uniflora*; this, however, was preoccupied by a plant of Robert Brown's.

No. 2858. *U. trichophylla* (Spr.). Scapo (5–12 unc.) pauci–multifloro, foliis capillaceo-gracillimis inter scapos erectis sursum pinnatifidis segmentis utrinque paucis angustissime linearibus simplicibus v. dichotomis, bracteis mediofixis, pedicellis remotis brevibus erectis, corollæ labio superiore integro elliptico v. ovato obtusissimo, calcari porrecto conico-cylindrico apicem versus oblique acutato labium corollæ inferius integrum subæquante v. vix excedente. Ad flumen Uaupès.

Radix fibrillis utriculiferis instructa. *Folia* 4–5 uncialia. *Bracteæ* basi obtusæ apice acutæ v. obtusiusculæ. *Pedicelli* breves calycem æquantes v. vix duplo excedentes. *Calyx* lobis subæquantibus obtusissimis altero emarginato. *Corolla* flava, calcari circiter 3 lin. longo.

Spruce describes the remarkable and extremely slender leaves of this plant as growing erect amongst the scapes.

No. 3011. *U. neottioides* (A. St. Hilaire), *β. pedicellata*. Scapo 1–1½ unciali 2–4-floro interdum bifido, pedicellis capsulam 2–4-plo excedentibus.

In rupibus humectatis Monte Cocui, San Carlos. Flor. mens. vii.

Although differing much from *U. neottioides* in habit, I do not discover technical characters sufficiently marked to warrant its

publication as a new species. In *U. neottioides* we find often many-flowered racemes, pedicels short, almost adpressed to the scape, "flowers subsecund, subnutant,"—altogether very suggestive of its specific name. In Spruce's plant the few flowers are not racemose, but with ascending or divergent pedicels 2–3 lines in length. Benjamin, in his Monograph of the Brazilian Utriculariæ, places this species under his section '*Ampullæ destitutæ. Folia divisa.*' Although I have not myself actually seen in the typical plant either leaves or bladders, yet I think he is here in error. In the present variety both occur, the leaves being entire. St. Hilaire and Girard, in a paper, previously quoted, on South Brazilian Lentibularieæ, &c. (p. 31), state, in describing their species—"Folia basi capillacea superius parum dilatata et divisa," &c., but follow with—"an potius primum integra, sed, parenchymate aquis mox destructo, nervi superstites?" I append a further description of the pedicellate form, which may be compared with the plant of St. Hilaire by those botanists who possess good specimens of it. It is not improbable but they may be correctly considered as distinct species.

Radix fibrillis utriculiferis instructa, utriculis gibboso-urceolatis prope basin lateraliter brevi-pedicellatis. *Scapus* erectus. *Folia* parva lineari-lanceolata integra obtusa, in petiolum gracillimum angustata. *Squamæ* scapi 2–3 ovatæ basi-solutæ utrinque obtusæ. *Calyx* lobis fere æquilongis, inferiore autem valde angustiore ovato obtuso, majore abrupte v. late rotundato-cuneato. *Corolla* albo-virescens, labio superiore concavo ovato-rotundato integro calycem plus quam duplo superante, labio inferiore profunde trilobo, lobis lineari-oblongis obtusis æqualibus, calcari saccato scrotiformi brevissimo obtuso.—Pedicelli fructiferi erecti. Capsula late elliptica v. obovata obtusissima, stylo subnullo.

No. 3238. *U. angustifolia*, Bj. (Linnæa, xx. pp. 311, 320). Flores flavo-virides. Esmeralda. Flor. m. xii.

No. 3735? Ad eandem valde proxima, differt corollæ colore purpurascente. Secus flum. Atabapo.

The specimens of this plant are imperfect.

No. 3241. Esmeralda, in campis humidis, xii. 1853.

Scapus 6 uncialis, foliis $\frac{1}{3}$–$\frac{1}{2}$ unc. longis obovato-spathulatis. *Flores* cærulei, fauce lutea.

A single specimen with but one flower remaining. It corresponds very well with the description of *U. bicolor*, St. Hil.; the form of the leaves, however, of that species is undescribed.

No. 2967. "Locis arenosis fl. Negro inundatis." San Carlos.

I refer this plant, though with some hesitation, to *U. cornuta*, Mx., of which I take it to be a small variety. In the same species may probably be merged *U. colorata*, Bj., and *U. appressa*, St. Hil. Style, at flowering, about equalling the ovary. Pedicels slender, erecto-patent, not shorter than the calyx. Spruce describes the leaves as ligulate, retuse, 1-nerved, with a few sacs underneath. Flowers yellow, with a red arc on the palate.

No. 1256. Barra?

No. 2257. San Gabriel.

No. 3644. Flum. Maypures.

These approach *U. subulata*, L., very closely. I cannot distinguish them from that species. *U. nervosa*, G. Web. MS. in Hb. Berol. (Benj. Monog. Utric. Bras. p. 247), seems to me doubtfully distinct from the same, and to this form probably Spruce's plants may be referred.

No. 3037. San Carlos. In bad condition; perhaps the same with the foregoing.

No. 924. Santarem. Likewise imperfect: apparently of the same difficult group with the last four numbers.

In the 'Linnæa,' vol. xx. p. 319, Benjamin describes, under the name of *Akentra*, a supposed new genus of *Lentibularieæ*, founded upon a plant of Hostmann's (Surinam Coll. No. 85), to but insufficient examples of which he had access. He appends to his description the following honest observation, which, however, can scarcely be said to establish the propriety of publishing the genus under such circumstances:—"Der Mangel des Sporns (weshalb ich den Namen *Akentra* (κέντρον, calcar) wählte) schien mir an mehreren Exemplaren, die ich sah, deutlich zu sein, doch waren die Blüthen durch das Trocknen so unkenntlich geworden, dass ich nicht ganz sicher bin, ob nicht vielleicht, was ich als Unterlippe beschrieb, der Sporn sei; künftige bessere Exemplare werden das entscheiden und vielleicht eine Aenderung des Namens nöthig machen." An examination of the specimens in the Kew Herbarium, collected by Hostmann, confirms the supposition here expressed, that the remarkably large, saccate, oblongo-cylindrical, and abruptly obtuse spur has been mistaken for the lower lip of the corolla, and that the plant is a true *Utricularia*. From the extreme delicacy of the corolla, I have not completed its examination, especially that of its upper lip; but as ample characters are elsewhere furnished for its specific identification, at least in relation to those already described, we may refer it to the proper genus under the name of *U. Benjaminiana.* It resembles *U. inflata* in size and the presence of a floating verticil of abortive foliaceous axes on the lower part of the scape.

U. Benjaminiana. *Axis* demersus; foliis capillari-divisis sparse utriculiferis. *Scapus* infra verticillum natantem pilosus supra glaber esquamosus 4–7 pollicaris, vesicis 6–10 lin. longis lineari-lanceolatis utrinque angustatis apicem versus segmentis capillaceis instructis, 6–multiflorus. *Bracteæ* basifixæ. *Pedicelli* calycem parvum æquantes v. duplo excedentes. *Calcar* denique 4–5 lin. longum, labio inferiore corollæ duplo longius, apice abrupte obtusum emarginatum. *Capsula* minute apiculata, seminibus circiter 5 complanatis ala membranacea anguste circumcinctis. *Akentra inflata,* Bj. Linnæa, xx. 319.

Note.—I may add to the above the correction of some misprints, &c., affecting the sense, which I observe in my paper on Indian *Utriculariæ*, published in the 'Linnean Journal' (Bot. Proc. vol. iii. p. 170). For "*aciculiferis*" and "*aciculifera*" (pp. 174, 175), read "*utriculiferis*," &c.; "Bracteis basi-*volutis*," read in all cases "*solutis*;" "*volute*" also, in foot-note, p. 174, should be "*solute*." In the description of *U. Wallichiana*, p. 182, line 7 from bottom, for "2–3-plo *longiore*" read "*breviore*."

Notes of a Visit to the Cinchona Forests on the western slope of the Quitenian Andes. By Richard Spruce, Esq. Communicated by Sir W. J. Hooker, F.R.S., F.L.S.

[Read Dec. 15, 1859.]

My last letter informed you that I was contemplating an expedition to the forests producing the Cinchona Tree on the western slopes of the Quitenian Andes. I was for some time doubtful as to what part I should visit—it was but two or three days' journey to the forests of Jilimbi and Guanujo at the western foot of Chimborazo, but to reach them the Paramo de Puenevata (the northern shoulder of Chimborazo) has to be passed near the snow-limit, and in the months of July and August it snows there almost incessantly, while the winds blow with a violence unparalleled even in this windy region, frequently hurling away both horse and rider, who are either seen no more, or their mangled remains are found at the foot of some precipice. Besides, only one sort of Cinchona was known to exist in those forests, whereas by going a few days' journey farther to the southward, to the forests below Alausi, in the valley of the river Chanchán, I might expect to find three sorts, and the road thither nowhere ascends above 12,000 feet. So the latter plan was finally adopted, and on the 22nd of July I sallied forth from the pleasant town of Ambato (8500 feet) along the narrow "callejon" (lane) which separates the eastern from the western branch of the Cordillera. My company comprised five horses and mules, one mounted by myself, another by my servant, and the remaining three laden with my baggage, consisting of drying-paper, clothing and bedding, and a copious supply of tea, coffee, and sugar—articles rarely to be met with in a country where there are no inns, and where the inhabitants with few exceptions use no other beverage than aquardiente and sour chicha. An arriero took charge of the beasts of burden.

Our first day's stage to Riobamba was a long one, 12½ Columbian leagues (about 40 English miles). The first five leagues, reaching to the village of Mocha, are along a very gradual ascent, varied by a few shallow quebradas. The soil is what in Yorkshire we used to call "a leight blaw-away sand," which, when the sun and wind are up, scorches and blinds the traveller, though it produces scanty crops of maize, barley, peas and lupines (eaten here under the name of "chocchos"). The indigenous vegetation is limited to a few insignificant weeds, chiefly Composites, nestling under the hedges of *Yucca* and *Agave*. The flowers of the two latter plants—so great a rarity in England—are here to be seen all the year round, and their tall tree-like peduncles are the poles used throughout the Cordillera for all common purposes, such as fences, rafters, and even walls of houses, &c. Long files of asses laden with them enter the towns of Ambato and Riobamba every market-day.

Beyond Mocha we leave the sandy country, and after passing two streams which descend from Mount Carguairazo, on our right, we begin to ascend to the Paramo de Sanancajas, the grassy meseta which extends along the eastern base of Chimborazo, at a height of from 11,000 to 12,000 feet. Near its commencement the road leading from Quito to Guayaquil branches off to the right, while that to Riobamba and Cuenca continues straight on. The weather had been rainy for many previous days, and we had had drizzling rain all the way to Mocha, so that we were not without apprehension of suffering from the cold on the paramo. Fortunately, just as we reached it, the sun shone forth, the clouds cleared away, and the glaciers of Chimborazo stood out against the blue sky like cut marble; but the ground was still so sloppy that what I had formerly passed over in two hours now took me three. What is called the "road" consists of I know not how many deep ruts, crossing and anastomosing in a very bewildering way, and so muddy and slippery that my horse preferred stumbling along among the hassocks of *paja blanca* (white grass)—a species of *Stipa* with feather-like silvery panicles tinged with rose—which forms the mass of the vegetation on the paramo. This grass affords excellent thatch; it is also extensively used in packing, and along all the higher grounds it is almost the only material for fuel. Between the hassocks, especially where there are slight declivities, there is an interesting sub-alpine vegetation,—a dense grassy turf is enamelled with flowers, white, yellow, red, and purple, which seem to spring direct from the ground. Three daisy-like *Werneriæ*, all stemless and solitary, of which *W. nubigena* with its large white stars is the most conspicuous, grow along with a stemless *Valeriana*, a small *Castilleja*, a *Lupinus*, a *Cerastium*, two species of *Gentiana* and two of *Azorella*. The cæspitose *Werneriæ* are true alpines, and grow at 2000 feet above the species just referred to. There are many little lakes, frequently bordered by the swelling, glaucous, sphagnum-like tufts of a *Plantago*, over which creep the silvery threads of a minute *Gnaphalium* and an equally minute white-flowered *Gentiana*. In such situations grow also a small *Ranunculus*, bearing generally a single sessile flower and a pedunculate head of follicles, a *Stachys*, and several other herbs of humble growth. Heath-like tufts of *Hedyotis ericoides*, often accompanied by a suffruticose *Valeriana* of similar habit, and sometimes by a *Calceolaria*, here and there diversify the landscape; while the hassocks shelter in their bosom purple *Lycopodia* and other plants.

Having passed Sanancajas, we descend to the sandy plain of Riobamba, whose general character is the same as that of Ambato, save that cactus-hedges often replace those of aloes.

In Riobamba I remained three days with my hospitable countryman Dr. James Taylor, and then proceeded on my way, going the first day only as far as Miraflores, a farm six leagues away from Riobamba, and near the village of Guamóte. On the way we had to climb over a small space of paramo, where we got the benefit of a storm of hail and sleet. The vegetation was scanty, and I gathered only a minute Umbellifer which was new to me. Miraflores is what is called a cold farm, consisting chiefly of pasture and barley fields. A short ascent from it brought us upon the Paramo de Tiocajas, which is full six leagues across. Anything more desolate than this paramo I have nowhere seen. It is one great desert of moveable sand, in which the distant patches of *Cacti*, *Hedyotis*, and a succulent *Composita*, only render its nakedness more apparent. Where there is a little moisture, solitary plants of a silky-leaved *Plantago* struggle for existence. The altitude is about the same as that of Sanancajas, and it may be imagined how cheerless was a slow ride of nearly twenty miles over such a waste, rendered all the more gloomy by a leaden sky overhead, and a piercing wind which came laden with mist and fine sand. I was obliged to go nearly at the pace of my loaded beasts, the unsettled state of the country, and the number of deserters from the "constitutional" army roaming about, rendering it unsafe to leave my goods a moment. Yet even such an "Ager Syrticus" has its points of interest, for on this place is seen the dividing of the waters of the Atlantic and Pacific oceans. We passed many small streams, some rising on the paramo, and some in the western Cordillera, but all running eastward to join the Great River, with whose waters and forests I was long so familiar; when, however, we approached the southern side of the paramo, we came on the Rio de Pumacháca (River of the Bridge of Tigers), a considerable stream rising in the eastern Cordillera and running westward towards the Pacific; it is in fact one of the sources of the river Yaguáchi, which enters the gulf of Guayaquil. From the Pumacháca northward, until very near Quito, all the streams of the central plain between the two branches of the Cordillera flow eastward, and unite in the gorge of Baños to form the river Pastusa, which speedily reaches the Amazonian plain, and thence the Atlantic; but the streams around Quito itself unite to form the river of Esmeraldas, and seek the Pacific. Near the Pumacháca there was rather more vegetation; patches of *Cyperaceæ* were dotted with the white flowers of a minute *Lobelia*, which I have seen in many similar situations, and groups of *Cactus* were draped over by an *Atropa*, remarkable for its aromatic leaves. It is singular that in so deadly a genus all the species I have seen in the Quitenian Andes have edible though very acid fruit, and that the shoots are cropped by asses and llamas.

As we descended from the southern side of the paramo, the *Hedyotis* began to be mixed with a small labiate shrub of very similar foliage, and bearing numerous spikes of lilac or violet flowers; and farther down the latter grew so abundantly that it covered the whole hill-side with a mass of aromatic flowers, which was an agreeable change from the sterile paramo. The road ran parallel to the Pumacháca, but at a vast height above it. It was well on in the afternoon when we reached the village of Ticsán, still in the cool region, and, as we calculated on finding more comfortable quarters in Alausí, which was two leagues ahead, we resolved to try to reach it, which we accomplished just after nightfall, having in the day made ten leagues. With some trouble we succeeded in getting a little food for ourselves; but food for our beasts was of more importance, and we could get none. At four o'clock the following morning I roused my people and sent them out to the neighbouring farms in quest of *alfalfa* (lucerne). They returned bringing a mule-load, which, though an insufficient quantity, was better than none, and we delayed our journey until eight o'clock, in order that the poor animals might eat, for we had this day only five leagues before us.

Our road now turned to the right, while that to Cuenca continues southward and crosses the elevated ridge of Azuáy. We still followed the course of the Pumacháca, which gradually turns westward, and bursts through the Cordillera in a gorge so deep and narrow, that with difficulty has a narrow path been cut along the declivity on the southern side. The whole five leagues from Alausí to Chúnchi consists of steep ascents and descents, and of perilous crossings of precipitous slopes, not to be passed without a shudder; for the track is in many places so narrow that two persons mounted could not pass each other without endangering the life of one of them. Fortunately our beasts were sure-footed and the road was dry; in fact, from Ticsán, where we fairly began to descend the western slope of the Cordillera, we found we had got into the height of summer, having left mid-winter behind us at Ambato and Riobamba. The hill-sides were well covered with grass, but all completely withered up by nearly two months of dry weather; so that except near the streams, where there was a margin of scrub or low forest, the eye rested on nothing green.

Alausí stands at about the same height as Ambato, but is subject to still more violent winds, so that even the crops of maize are rarely to be seen standing erect. As a town, it bears no comparison with Ambato either for size or neatness, and, like all the other pueblos of the canton (of which it is the *chef-lieu*), seems to have been for several years in a state of decadence: the houses begin to fall and are merely propped up, not repaired or rebuilt; and yet there are all around valuable farms of wheat and maize.

Throughout the Quitenian Andes a bit of solid rock is rarely seen, save where black, jagged masses of trachyte stand out in the higher peaks, which are all either active or dormant volcanos; and on a superficial view most of the hills seem to be made up of *débris*, either, as around Ambato, of calcined and triturated granite and schists, or, as in descending from Alausí, of stones and rude blocks confusedly heaped together. But in one place we saw above us a low cliff of vertical strata, much cracked and bent, as if by some force applied to their ends. The brown hill-sides began to be diversified by an arborescent *Cactus*, with polygonal stems and white dahlia-like flowers, which, Briareus-like, threw wide into the air its hundred rude arms. Lower down, at about 6000 feet, I saw specimens full 30 feet high and 18 inches in diameter. Along with it grew frequently a *Cæsalpinia* and a *Tecoma*, both of which are abundantly planted near Ambato and Guano, the former for the sake of its bark, used in tanning, and the latter because it bears a profusion of ornamental yellow flowers, and is supposed to possess wonderful medicinal virtues.

About two leagues below Alausí the road descends to the margin of the river, where it meets the Chauchán, a larger stream coming from the eastern Cordillera, near the volcano Sangáy; the two united take the name of the latter, and preserve it until issuing into the plain, where, joined by the Chimbo from Chimborazo, they form the river Yaguáchi, which empties itself into the gulf just above the city of Guayaquil. Crossing the Chanchán by a rude bridge near its junction with the Pumacháca, we entered on a beach clad with a grove of Acacias—low spreading trees with very odoriferous yellow flowers and binate spines sometimes three inches long. Near this place, which was still some 8000 feet above the sea, we came on the first sugar-cane farm. The road again leaves the river, and we had finally to climb a long cuesta to reach the village of Chúnchi, which is full 1500 feet above the river.

Chúnchi is the last village on the slope of the Cordillera, and I had calculated on making it my head-quarters, though the forest is still a day's journey farther down. I brought recommendations from Ambato, and the people seemed willing to assist me; but the houses were so miserable, so full of dirt and vermin, and so utterly destitute of furniture (for I could procure neither bedstead, chair, nor table), that I saw I should work on my plants with infinitely less comfort than I used to do in a palm-hut in the warm forest. Another and greater difficulty was the procuring of food for my beasts, for all the pastures were dried up, and a man who sold me alfalfa for two days then told me he could spare no more. About a league from Chúnchi and 1000 feet lower down, there is a cane-farm called Guataxí, whose owner, Señor José Leon, I had known in Riobamba. Almost in despair, I rode down to consult with him, and he at once invited me to take up my quarters in the hacienda, where he has a good house, with neatly papered rooms and decent furniture. The cane-grounds extend along the banks of a stream, which before falling into the Chanchán forms a considerable lake, on whose shores there was still a little herbage; besides that a few squares near the house were planted with alfalfa.

On the third day after establishing myself at Guataxí, having procured a guide, I proceeded to Lucmas, a short day's journey lower down the river, where there are a few small chacras tenanted by Indians and zambos. There I was told I should be near the *Cascarilla roja*, and I was recommended to a person called Bermeo, who had worked a good deal at getting out cascarilla and sarsaparilla. I at once secured his services, and, as he turned out an honest active fellow, I took him with me in all my subsequent excursions in the district. From him I learnt that the *Cascarilla roja* did not commence until another day's journey downwards, and that to have a chance of seeing it in any quantity (which, he admitted was, at best, only problematical), it would be necessary to penetrate at least three days into the forest. As my object for the present was merely to make myself acquainted with the plant, and with the soil and climate in which it grows, I decided on going no farther than until I should meet with it; for the procuring and transporting of provisions, necessary for a long stay in the forest, is both difficult and expensive.

I remained a day at Lucmas to look around. It is at an altitude of between 5000 and 6000 feet, and produces luxuriant sugar-cane. The small banana called "Guinéo" flourishes (as indeed it does at Guataxí), but the plantain is near its upper limit, and the fruit is small and scanty. There are tolerably lofty forest trees in the valleys and on the hills, while the steep sides of the latter are often covered with grass, more or less intermingled with scrub, and often with Bromeliaceæ. In descending towards Lucmas, I saw on the bushy hill-sides a great deal of the small tree called "Palo del Rosario," a curious, and I believe undescribed *Sapindacea*, which I had already gathered at Baños in the eastern Cordillera. Its most remarkable feature is, that while the layer of wood next the bark is quite white, all the internal layers are purple-brown with a black outer edge—a colour not unlike that of old walnuts; so that articles fabricated of this wood are curiously mottled. Unfortunately the trunk never exceeds a few inches in diameter, so that only small articles can be made of it. I have secured a specimen of the wood, and of spoons made from it, for the Kew Museum.

One of the most frequent trees at Lucmas, and the most valuable for its hard wood (though the young branches are brittle), is an *Escalloniacea*, called "Ignia." It grows to a good size; the leaves are narrow-lanceolate and very long—the lower ones always red, and the reddish flowers are borne in long pendulous racemes; so that the tree has a very pretty aspect. It abounds along the western slope of the Cordillera, and grows at from 5000 to 9000 feet. It is accompanied by an Amyrideous tree, called "Alubilla," which the people hold in great dread, as they believe that to touch it or pass beneath its shade is enough to cause the body to swell all over. I had already, at Baños, gathered flowers and fruit of it, and stained my hands with the milk, to the great horror of those who saw me, but without experiencing any ill effects; and I believe that the swelling attributed to it is owing more to sudden changes of temperature, or to alternate scorchings and wettings, for I have seen such an effect follow where there was no Alubilla. Be this as it may, the young man I took as guide felt one of his eyes begin to swell the day we left Lucmas for Guataxí, and in a few hours he was swollen from head to foot. In two or three days he was quite well again, but there are cases of the swelling lasting a month. As might be supposed, the blame was laid on the Alubilla.

Lucmas takes its name from the abundance of a species of *Lucuma*, producing an edible fruit; that name is applied to many species of *Lucuma* and *Achras*, all natives of warm or hot countries. Another evidence of the approach to a hot climate was in the existence of a species of *Echites*, twining among the bushes, and in an epiphytal *Marcgraviacea*, quite similar in its long scarlet spikes to *Norantea guianensis*, though the bracts are small patellæ, not elongated sacs, as in that species. A very odoriferous *Citrosma*, with large thin leaves, three together, is known by the name of "Guayúsa," and is often taken in infusion, like the Guayúsa of Canelos, which, however, is a species of *Ilex*.

There were a good many herbs, of species not seen elsewhere. One *Composita*, with virgate stems 12 feet high, large alternate, lobed leaves, and from each axil a small leafy ramulus bearing at its apex a corymb of white radiate flowers, was very ornamental.

Orchideæ were tolerably abundant, but prettier even than these were two *Bromeliaceæ*; the one seemed at first sight merely a mass of long scarlet flowers growing out of the moss on old trees and stones, for the leaf-sheaths are imbricated into a little bulb, and the blade is reduced to a spine; the other (apparently an *Æchmea*) has broadish soft leaves and large violet flowers looking at a distance more like those of an *Iris* or an *Amaryllidea*.

On the 4th of August my company started for the forest, our destination being the Rio de Puma-cocha, a large stream rising in Azuay and falling into the Chanchán at about 4000 feet altitude, on the farther side of which much Red Bark has been got in former years. We started on horseback, and a mule carried our necessaries. My counsel was, to leave the horses, but Bermeo felt sure I should not be able to perform the distance on foot; we had gone, however, a very short way when we found it necessary to cut our way through the forest, for the track had got overgrown in two years that no one had passed along it; nor was it possible without wasting a good deal of time to open a passage overhead so that a man might pass mounted; I therefore preferred going on foot most of the way. We reached the banks of the Puma-cocha at an early hour of the afternoon, but the ford which Bermeo had passed in former years had been destroyed by the falling of a cliff, and in its place we found a deep whirlpool; so with the drift-wood along the banks we set to work to make a bridge where the river was narrowed between two rocks, and when completed carried across it our baggage, saddles, &c. Then, after a long search, we found a place where we could swim the horses over, and by rolling down a good deal of earth and stones we made a way for them to ascend on the other side. Once across, we selected a site for our hut among vegetable-ivory palms, and thatched the hut with fronds of the same. Close by were the remains of a platanal, showing that the spot had formerly been inhabited, and fortunately still bearing a sufficient number of plantains to cook along with our salt meat, during the two days we calculated on remaining there. Our horses were taken to the top of a neighbouring hill, where there was a bed of one of those large succulent Panicums called "Gamalote," which afford a very nutritious food for cattle, and were there made fast for the night. Here we slept tranquilly, save that we were occasionally aroused by the snuffing of bears around us; and before daylight Bermeo and his companion were on foot, and making their way through the forest in quest of Cinchona-trees. They returned at seven o'clock, having found only a single tree standing, and from that one the bark had been stripped near the root, so that it was dead and leafless. We breakfasted, and then I accompanied them into the forest. We followed the track they had already opened, and then plunged deeper in, meeting every few minutes with prostrate naked trunks of the Cinchona, but with none standing. Bermeo several times climbed trees on the hill-sides, whence he could look over a large expanse of forest, but could nowhere get sight of the large red leaves of the Cinchona. At length we began to tire, and we decided on returning towards our hut, making a detour along a declivity which we had not yet explored. We went on still a long time with the same fortune, and were beginning to despair of seeing a living plant, when we came on a prostrate tree, from the root of which a slender shoot, 20 feet high, was growing. My satisfaction may well be conceived, and my first thought was to verify a report that had been made to me by every one who had collected Cascarilla, namely, that the trees had milky juice, which to me was strange and incredible in the *Rubiaceæ*. Bermeo made a slit in the bark with the point of his cutlass, and I at once saw what was the real fact. The juice is actually colourless, but the instant it is exposed to the air it turns white, and in a few minutes red. The more rapidly this change is effected, and the deeper is the ultimate tinge assumed, the more precious is the bark presumed to be. It is rare to find shoots springing from an old root, because the roots themselves are generally stripped of their bark, which, along with the bark from the lower part of the trunk, is known by the name of "Cascarilla costrona" (from *costra*, a scab), and is of more value than that from any other part of the tree.

The *Cascarilla roja* seems to grow best on stony declivities, where there is, however, a good depth of humus, and at an altitude of from 3000 to 5000 feet above the sea. The temperature is very much that of a summer-day in London, though towards evening each day cold mists blow down the valley from Azuay; and for five months in the year—from January to May—there is almost unceasing rain.

If the *Cascarilla roja* has been almost extirpated at Puma-cocha, there is still left abundance of *Sarsaparilla*, and of a very productive kind, for Bermeo assured me he had once taken 75 lbs. weight of the roots from a single plant; whereas in Brazil the greatest yield I have heard quoted was a little over 30 lbs. The Puma-cocha species has a round stem and few prickles, while that most esteemed on the Rio Negro has a triangular stem thickly beset with prickles.

Let me now say a word about the other plants accompanying the *Cascarilla,* and first of the Ivory-palm, which is known throughout the Ecuador by the name of "Cádi." In Maynas two species of *Phytelephas* were tolerably abundant, the one a slender species called "Yarina," and the other much stouter, called "Polo-ponto."* Both were usually stemless, though ancient specimens had a short inclined stem. Neither of them seems to coincide with the *Phytelephas* described by Seemann. But the Cádi seems distinct from all the preceding: it has a stout erect trunk of 15 or 20 feet; the fronds are 30 feet long, and *the pinnæ are fastigiate by threes or fours* (as in several *Bactrides* and *Astrocarya*), while in the other species they are equidistant; lastly, *the male flowers are racemed on a long pendulous spadix.* The nuts are much the same as in the other species, only rather larger; they are extensively used in the Sierra for making heads of dolls, saints, and walking-sticks. The Cádi produces a very excellent "cabbage," but the Indian and other inhabitants are fonder of a large maggot, called "Majón," which is bred in its trunk. I have seen the Indians of the Rio Negro and of Canelos roast and eat the larva of a beetle extracted from the trunk of the Popunha palm (*Guilielma speciosa*).

A species of *Carludovica* with pinnate aculeate fronds was also frequent. *Triplaris surinamensis,* with its large bunches of triquetrous red fruits, was quite as abundant as on the Amazon; and *Lasionema roseum,* a tree closely allied to the *Cinchona,* grew side by side with the *Triplaris* at Puma-cocha, just as it used to do at Tarapoto.

In general the arborescent vegetation seemed scanty in species and uninteresting. One of the most striking trees was an *Erythrina* with a slender tortuous (almost twining) trunk, from which sprang long spikes of scarlet flowers, and few branches bearing each a coma of ternate leaves, whereof the leaflets were sometimes 18 inches across. There were also a few figs, and on the steep declivities there were patches of low forest, consisting chiefly of *Clusiæ, Thibaudiæ* and *Melastomaceæ.* Two small *Trichomanes* crept along the branches of shrubs, but terrestrial ferns were all but absent.

On returning that evening to our hut, I consulted with Bermeo about our ulterior movements. He told me that if I would go another day's journey into the forest, he could with certainty show me more trees of the *Cascarilla roja*, which he had seen not many months previously, and, as on account of the revolution no one had this year entered the forests to collect Cascarilla, it was probable they were still untouched. But for this our stock of provisions would scarcely suffice, and I saw no probability of adding anything interesting to the general collection; besides, I had to visit other forests in quest of other sorts of Cascarilla, and I saw the season was already passing for the flowers and seeds of most trees. We therefore on the following day retraced our steps up the valley, and after another day spent at Lucmas in drying my paper and adding what I could to my collection, I returned to Guataxí.

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* Most likely "Púlu-púntu" is the original Quichua, as the letter "o" does not exist in that language.

I was unable to move far from the farm for above a fortnight afterwards, on account of the passage of the Government troops from Quito to Cuenca; for their general, to avoid the cold and stormy Azuay, had decided on passing by Guataxí, whence by a rough track through the woods one may come out at Cañar in two or three days. The owner of Guataxí had taken a prominent part in a late rising against the Government—the insurgents had been defeated in a pitched battle on the flanks of Chimborazo, and now the victorious party threatened terrible things—so he judged it expedient to keep out of the way, and to hide all his horses and cattle in the hills. When the troops actually reached Chunchi, I went thither and had an interview with their chief, from whom I exacted a promise (which was faithfully kept) that nothing on the farm should be molested. You would be nowise interested with anything I could tell you of political squabbles here, which, were it not for the occasional bloody episodes and the wholesale robberies under the name of "contribuciones voluntarias," would seem more like children's quarrels than anything else.

During this interval I was obliged to content myself with the flora of Guataxí. The cane-farm is about 7000 feet above the sea; the maximum temperature each day was generally about 73°, though it once reached 77°, and the minimum temperature varied from 55° to 60°. A plateau, about a thousand feet higher, belongs to the farm, and produces good crops of grain and potatos. The hills adjacent to the farm, except where under cultivation and artificially irrigated, are covered with grass, amongst which the withered remains of a good many annuals were visible. Almost the only annual still flourishing was, singularly enough, a species of *Monnina*, with violet flowers; and, as most of the species of this genus are trees, I took it for a *Polygala* until I saw the fruit. The "Yerba Taylor" (*Herpestes chamædryoides*, H.B.K.), which has great fame as a remedy for snake-bites, was frequent, but mostly scorched up. Amongst the perennial herbs (most of which were new to me) may be mentioned an *Epilobium*, a *Stachys*, a *Phaseolus*, a *Desmodium*, two *Crotalariæ*, a shaggy *Hieracium*, a very pretty *Leria* with large blue flowers, growing on shady banks, and a branched *Composita* with silky-white leaves and handsome purple flowers, besides several *Solaneæ*, *Labiatæ*, *Ehretiaceæ*, and two *Acanthaceæ*, which last order seems entirely absent from the cold region; also a suffruticose *Lantana* with yellow flowers, which I had not seen elsewhere. In moist places a little *Cuphea* was very abundant. The shrubberies consisted chiefly of *Compositæ*, whereof one resembled a *Spiræa* in aspect and in the odour of its numerous small white flowers; but there was also a new *Büttneria*, and the common *Clematis* of the warmer parts of the Cordillera climbed about everywhere.

In cultivated ground, especially in the maize and cane fields, two delicate broad-leaved *Paspala*, called "Achín," spring up in great abundance. Every day I saw the servants of the farm get bundles of them for the cows, pigs, &c., which ate them with greater avidity than even the alfalfa, so that, though weeds, they were nearly as valuable to the owner as the crops amongst which they grew.

Among the trees, which grew chiefly along the banks of the river, were two species of *Lycium* not previously seen, an *Inga*, a *Mimosa*, and a *Bignoniacea* with broad opposite leaves and cymes of large purple flowers. The last, known by the name of "Hualla," is frequent in the western Cordillera at from 6000 to 9000 feet, and is one of the best timber-trees. It is not improbably the little-known *Delostoma integrifolium*, Don; but it is not a *Delostoma*, for, besides an essential difference in the calyx, the septum is contrary to the valves, as in *Tecoma*, not parallel to them, as in *Delostoma* and *Bignonia*.

So soon as the last soldier had passed, I put in execution my project of visiting the forests producing the *Cascarilla serrana* or Hill Bark, which is found at 8500–9000 feet on both sides of the river Chanchán. I went first to the forest of Llalla, at the foot of Azuay, and only a little more than two hours' journey from Guataxí. Here there is a cattle-farm and a few Indian chacras, in one of which I established myself. I found a rather interesting vegetation, and this consoled me for my wretched quarters in a hut dark and smoky, and so low that I could not stand erect. We had happened on a windy time, and as the walls and roof were full of chinks, the violent wind which got up at midnight starved us beneath all our blankets and ponchos. After sunrise there was a brief lull, and then it came on again to blow from the same quarter (west, with a slight touch of northing) and so continued through the day. We had no rain during the five days of our stay, although the storms on the farther side of Azuay often overlap as far as Llalla, so that from Guataxi we could see it raining in this hill-forest, when not a drop fell in the lower grounds; and even when it does not rain the forest is generally enveloped in mist. This constant supply of moisture renders the vegetation more vigorous than in the dry grounds below, and is the cause why the trees are so thickly clad with mosses that it is difficult to push one's way through them. Two mosses, whose long slender stems hang down like a beard from the branches, bore here abundance of fruit, which for two years I had sought in vain in other localities. But I was most pleased to find a moss with large laciniato-ciliate leaves—so novel a feature in this tribe, that I took it for a *Plagiochila*, until I found the capsules nestling amongst the terminal leaves.

To return however to our Cascarillas, of which there are two sorts in Llalla, the one called "Cúchi-cára," or Pig-skin, because dried pieces of the bark resemble morsels of pig's-skin boiled and then grilled (which is a favourite dish in Ecuador). The same bark is sometimes called "Cháucha," a term implying thickness without much consistence; as, for example, in this bark, which shrinks much in drying, and in a sort of large watery potato, called "Chauchas." The other bark is called "Pata de gallinazo," or Turkey-buzzard's foot; it does not peel off freely like the other, and when dried generally occurs in small split fragments, but as it is rather deeper-coloured it is more esteemed than the *Cuchicara*. The same, or similar kinds, are known in other districts as "Cascarilla naranjada." The demand for either kind has of late years been very slight, so that there has not been such destruction of these barks as of the red, and on a stony hill-side not far from the hut I found above twenty large trees of the *Cuchicara*, from 40 to 50 feet high. All had fruited freely this year, but the capsules were already empty, with the exception of one small corymb In the forest of Yalancáy, on the opposite side of the river and near the road leading from Alausi to Guayaquil, I afterwards found a tree with recent fruit and even a few flowers. The latter are deep brick-red, and the capsules are usually elongate-oblong, but vary to roundish-oblong. Trees of the *Pata de gallinazo* were scarce, and I did not see any in flower or fruit. Both sorts have the leaves broadly oval, with or without a slight apiculus, and pubescent beneath; but in the *Cuchicara* the petiole and midrib are red, which is not the case with those of the *Pata de gallinazo*, nor do the leaves of the latter turn so red with age. The *Cuchicara* has but few virgate branches, while the other has a denser ramification. The leaves of the *Cascarilla roja* are of almost the same form as in the other two—perhaps slightly narrower—and I confess that if I had been shown the leaves only of all three, I should without hesitation have referred them to the same species. I hope the flowers and fruit may afford clear distinguishing characters. The bark of the *C. roja* is a deep purple-brown when good; that of the other two species a pale cinnamon-colour. It is customary to scrape off the external asperities and lichens in the latter, when the surface remains of a pale or whitish colour, but this is never done with the *Roja*. The *Cascarilla roja* is well known to abound in both quinine and cinchonine, and is considered far more efficacious in the cure of intermittent fevers than the other two, which however are sometimes used in preference when it is desired to avoid the astringent effects of the *C. roja*.

Of the trees growing along with the Cascarillas in Llalla the "Motilón" was the most frequent and the largest, attaining sometimes 60 feet high. This is the second species I have gathered under this name: the fruit is an edible drupe, but I hesitate to refer the genus to *Amygdaleæ* until I see the flower. With the Motilon grew, however, a true *Cerasus*, with very large leaves; it had flowers and young fruit. Other trees in the same forest were the *Hualla*, the *Ignia*, a *Berberis*, a *Rhamnus*, a *Nonatelia*, two *Myrtaceæ*, and especially an arborescent *Loranthus*, with dense spikes of fragrant yellow flowers,—the leaves on some ramuli alternate, on others opposite, and on others three together. I had previously gathered it on Tunguragua. There was also a Solaneous tree, allied to *Lycium*, but with dull yellow bignonioid flowers growing from the naked branches, and in its whole habit reminding me much of *Crescentia*. The shrubs included a *Barnadesia*, two *Salviæ*, a sarmentose *Fuchsia*, and most abundant and ornamental an aphyllous *Fuchsia*, epiphytal and (after the manner of a *Cornidia*) climbing high up the trees, which it adorned with its large vermilion flowers.

Patches of verdant pasture were scattered in the forests, and in these I gathered a stoloniferous *Ranunculus* new to me, a small *Juncus*, a curious *Rubiacea* allied to *Richardsonia*, two *Ionidia*, the one with red the other with scarlet flowers, and some other herbs. In the woods there was also a stinging herb with large white flowers of the N. O. *Loaseæ*.

The *Orchideæ* must not be forgotten—they were very numerous and in fine state, especially two large-flowered *Odontoglossa*, whose liana-like peduncles depended almost to the ground. There were also some *Oncidia* and *Epidendra*, and many curious things whose affinities I did not recognize, and which I have not yet examined.

From Llalla I despatched my men to the adjacent paramos on that side of Azuay, with instructions to bring me everything they found in flower. They returned bringing a good many alpines, including some pretty *Senecios* not elsewhere seen, a red-flowered cæspitose *Werneria*, a small *Crucifera*, an *Alstrœmeria*, a *Gnaphalium*, but especially a beautiful *Gentiana*, allied to *G. cernua*, and instead of having only one or two pendulous flowers, as in that species, bearing a profusion of erect pyriform red flowers. It is called "Rocotilla" by the inhabitants, from the similarity of its flower to the fruit of a species of *Capsicum* called "Rocote," which is cultivated throughout the cold region.

I have only a few more words to say about the Cascarillas. I have conversed with many people who have worked on the *C. roja*, and all profess to know of places where large trees were left standing last year. As no one has entered into the trade in this present year, those trees may have borne a crop of seeds, from which by next year a number of young plants will have sprung up. They offer also to take me to places where there are beds of young plants of two or three years' growth. In the forests about the foot of Chimborazo I am told that those who cut down bark-trees break off the young branches and stick them into the ground, where most of them take root—a very laudable practice if the effect be such as is stated. It would appear from this that cuttings might be safely tried. I planted two sprigs of the *C. roja* in Bermeo's garden at Lucmas, which were growing when I last heard of them. From what I have this year seen, it appears that the Cinchonas flower at the end of the rainy season —that is in May—and have ripe seeds in July, like a great many other trees. May is the earliest month in which the forest could be entered, and even then not without difficulty and risk. I have made out that the town of Milagro, from which Guayaquil can be reached in a day by navigating the river Yaguachi, would be a convenient dépôt for the seeds and young plants got out in the forests of Pumacocha, which are three days' journey above. The road is, however, so narrow and bad that there would be small chance of getting live plants down to Milagro in boxes or baskets, either on mules' or men's backs, and I see no other way than putting each plant into a bamboo, where it would travel in perfect safety.

In a farm called Piñancay, adjoining Guataxi, I became acquainted with the owner, Dr. Najera, a very intelligent man, and formerly deputy to the Congress. He has a cattle-farm on the eastern side of Azuay, at the head of the river Jubál; and in a day's journey down that river a forest is reached in a temperate clime, where a great deal of excellent bark has been collected, esteemed nearly equal to the *Cascarilla roja.* This bark is known as "Cascarilla acanelada," and Dr. Najera describes the tree as having a small shining leaf, like that of the orange. In this month or the next the rainy season will be over on the eastern side of Azuay, and if I receive my orders in time, I propose going thither with Dr. Najera in January, when it will be midsummer there, and the *Cascarilla acanelada* should be ripening its seeds. I fear there is no chance of getting young plants alive to the coast, across the ridge of Azuay, 15,000 feet and more in height.

Ambato, Republic of Ecuador,
Oct. 20, 1859.

Notice of the Discovery of *Lastrea remota* in England. By THOMAS MOORE, Esq., F.L.S., F.H.S.

[Read Dec. 15th, 1859.]

IN the course of the past summer, Mr. F. Clowes of Windermere sent me a frond of a fern found by him in the Westmoreland lake district, doubtfully labelled *Lastrea Filix-mas*, v. *incisa*; and he observed that for some years it had been considered to belong to *Lastrea spinulosa.* A specimen subsequently sent, when in a more fully developed state, led to a comparison with the *Aspidium remotum*, A. Br., for a frond of which I am indebted to Professor Mettenius of Leipsig, and this comparison proved the German and Westmoreland plants to be of the same kind.

This *Aspidium remotum* had been first noticed by Braun* as a variety of *Aspidium rigidum*, but it was subsequently regarded by him as a distinct species, and was described under the name of *Aspidium remotum*[*]. It has subsequently been adopted as a species by Kunze[†], by Fée[‡], by Mettenius[§], and by Koch[||]. Braun's plant, as far as I am aware, has hitherto only been recorded as a native of Southern Germany, to which must now be added the English habitat of Windermere, Westmoreland.

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* A. Br. in Döll. Rhein. Fl. 16.

In general character and aspect the plant very much resembles the vigorous examples of *Lastrea spinulosa* which are sometimes met with, having like that fern narrow elongate erect fronds; but its structure agrees more closely with that of *L. Filix-mas*, than which, however, it is once more divided. It has neither the appearance nor the structure of *L. rigida*. The plant appears to me to have very reasonable claim to specific rank, though on this point it is in these days hopeless to expect unanimity of opinion.

I append the specific character and synonymy of this addition to the British flora, together with a full description of the Westmoreland plant.

LASTREA REMOTA: fronds oblong-lanceolate, subtripinnate, smooth; pinnæ acuminate, distant below; pinnules distinct, pyramidal or ovate-oblong, acute, shortly petiolate below, sessile, with a narrow attachment, or more or less adnate upwards, the basal ones pinnatifid almost to the costa; lobes oblong, blunt, serrated, the serratures acute mucronulate; sori copious over the whole frond, biserial near the costa; indusium reniform, obscurely eroso-dentate, persistent, without glands; stipes and rachis stout, scaly.

Lastrea remota, *Moore, Index Filicum*, 102.

Aspidium remotum, *A. Braun, Verjung.* 330; *Kze. Linn.* xxiii. 230; *Fée, Gen. Fil.* 291; *Metten. Fil. Hort. Bot. Lips.* 93; *id. Aspid.* 57.

Aspidium rigidum, β. remotum, *A. Braun, Döll. Rhein. Fl.* 16.

Polystichum remotum, *Koch, Syn. 2 ed.* 979.

Hab. Windermere, Westmoreland (*F. Clowes*, 1859).

Caudex......... *Stipes* a foot long, stout, clothed with numerous scales of various size, some ovate-acuminate, $\frac{3}{4}$ of an inch long, others smaller, lanceolate or linear, terminating in a lengthened hair-like point, the margins slightly wavy or toothed; along with these larger ones occur numerous others, which are minute, ovate caudate, and peltately attached. *Rachides*, both primary and secondary, furnished with scales, which become smaller upwards. *Fronds* (including stipes) 3–4 feet high, erect, narrow, oblong-lanceolate, smooth, subtripinnate. *Lower pinnæ* 3–4 inches long, ovate acuminate; central ones 6 inches long, linear-oblong acuminate, all ascending, opposite or subopposite, and distant below. *Pinnules* (basal ones of second pair of pinnæ) 1¼ inch long, shortly stalked, pyramidal or pyramidal-ovate, acute, pinnatifidly divided nearly to the costa, almost pinnate; lobes oblong, obtuse, about ⅜ inch long, the lowest ones sublobate at their base, otherwise toothed or serrated; the serratures most numerous and prominent at the apex, acute and mucronulate. The pinnules become gradually less pyramidal or ovate, and more oblong, at length linear-oblong as they recede from the main rachis; below, except in the case of the lowest, they are also sessile with a narrowed attachment, but become gradually more and more adnate upwards. The pinnules of the upper pinnæ resemble the smaller pinnules of the lower ones. *Venation* in the larger lobes, consisting of a flexuous primary vein or costule, from which alternate veins proceed towards the serratures of the margin, sometimes becoming branched; the sori are situated medially on the simple veins, and close above the fork on the branched ones. In the smaller pinnules the costule bears a sorus medially on its lowest anterior vein, so that a row of sori are formed on each side of and near to the costa; the basal lobes often bear in addition two or three more sori, and are traversed by a series of alternate simple veins. *Fructification* occupying the whole back of the frond from the base to the apex. *Sori* prominent, distinct, biserial near the costa of the pinnules, and in the larger ones biserial on the lobes. *Indusium* persistent, reniform, obscurely eroso-dentate on the margin, not glandular.

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[*] Braun, Verjung. 330.

[†] Kze. Linn. xxiii. 230.

[‡] Fée, Gen. Fil. 291.

[§] Mett. Fil. Hort. Lips. 93; id. Aspid. 57.

[||] Koch, Syn. 979.

Notes upon the British Herbarium of the Linnean Society.

By Daniel Oliver, jun., Esq., F.L.S.

[Read Dec. 15th, 1859.]

It has occurred to me that, from the interest felt in British Botany by many members of the Linnean Society, it might not be amiss to present, in the form of a little notice, in the 'Journal of Proceedings,' a short account of the Herbarium devoted to our own Flora, upon which, at the request of the Herbarium Committee of the Council, I have been engaged, at intervals, within the past two years.

That the formation of such an Herbarium was contemplated, and had indeed considerably progressed, may be gathered from the allusion to it in a late Anniversary Address of our President*, and from its cursory mention in the published 'Minutes of Proceedings.' It has not hitherto, however, been thought needful or desirable to appeal to Fellows for assistance in the contribution of desiderata, chiefly because it was, in the first place, to be ascertained how far the extensive collections already in the possession of the Society might furnish suites of specimens sufficiently ample for the complete illustration of the various species, and, further, from the probability that a great portion of such desiderata as might remain, especially among the more critical groups, as the *Rubi*, *Salices*, &c., would be supplied to us by Fellows of the Society who have devoted their special attention to the study of such groups, and whose labels bear a high authenticity.

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* Journal of Proceedings, vol. iii. p. xx., 1858.

I shall briefly state the extent to which we have, to this time, been able to carry out the design of rendering this collection a thoroughly standard one, and as complete as possible in respect to representatives, not only of each recognized British species, but of each marked form or variety. I ought here to say, that from the very limited accommodation which the Society can afford to this Herbarium, it was early apparent that it would be out of the question to attempt to make it illustrate, in anything like completeness, the geographical distribution of the respective species through our islands; yet in the selection of the required specimens those have been laid in by preference which at the same time indicated by their labels a different locality or extension of area.

The collections which have been accumulating in the Society's rooms over many years have furnished the important nucleus of the present Herbarium; these have been successively gone over, and such examples selected from them as seemed suited to the object in view. Of these collections by far the most important, and affording the great proportion of select specimens, was that bequeathed to the Society by the late N. J. Winch of Newcastle-on-Tyne, an excellent local botanist, and author of one of the best of the older Floras—that of the counties of Northumberland and Durham, published in the 'Transactions of the Natural History Society of Newcastle.'

From a condition in his bequest we are not permitted to remove his specimens from the paper upon which they are mounted, nor to glue down upon the same sheet additional examples; hence between these and the papers now in use, uniform in size but superior in quality, a difference is sufficiently obvious*. From time to time, however, these specimens, which at present form perhaps the major part of our collection, may be removed, if thought desirable, on the substitution of other and yet better examples.

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* Contributions to the British Herbarium, to which conditions are annexed limiting the Council in their absolute disposal, cannot in future be accepted.

As might be expected, Winch's Herbarium was rich in North of England plants; of these, his fasciculi of Roses and Willows were particularly extensive: it contained also many rare species from other quarters, received from his correspondents or collected by himself on his longer excursions. A second collection in the Society's keeping was that of the late Dr. Withering, author of the 'Botanical Arrangement of British Plants,' presented to the Society by Beriah Botfield, Esq., F.L.S., grandson of the Doctor. In this Herbarium, deserving of especial attention, was a series of specimens, many of them of infrequent or rare species, collected by the late Robert Brown, near the close of last century, in Scotland and Northern Ireland. These are peculiarly interesting from the valuable notes which accompany them, in Mr. Brown's handwriting. They bear most striking testimony to the early development of his well-known habits of close, sagacious observation and minute accuracy. These were mostly gathered from the year 1791 to 1794, from about the eighteenth to the twenty-first years of his age.

From these herbaria, and also from minor collections formed by Woodward, Relhan, Maton, Dickson, and Don, with packets contributed from time to time by various collectors, a considerable selection of specimens has been made, and amongst them are several which, from their increasing rarity or actual disappearance from within our borders, or from other circumstances, are more particularly noteworthy. Of such we find *Sonchus palustris*, L. (Kent, Cambridge), *Senecio paludosus*, L. (Lakenheath), *Frankenia pulverulenta*, L. (Sussex), *Caucalis latifolia*, L. (Newmarket), *Cypripedium calceolus*, L. (Castle Eden Dene, and Helk's Wood, Ingleboro'), *Carex Davalliana*, Sm. (near Bath), *Eriophorum alpinum*, L. (Restennet, near Forfar, R. Brown), *Elymus geniculatus*, Curt. (near Greenwich, Dickson), *Potentilla tridentata*, Sol. ("East Rocks, Loch Brandy," Don), *Epimedium alpinum*, L. (Hb. Withering, marked "Mr. Robson, from Skiddaw," &c., and Carrock Fell, Cumberland, 1787), *Orchis hircina*, Scop. (Dartford), and *Anthemis anglica*, Sm. (Sunderland, Robson*).

Besides the collections above enumerated, which were examined in the course of last year, we have received recently from Mr. Salter the liberal present of the herbarium formed by his brother, the late Dr. T. B. Salter of Ryde: in addition to an admirable collection of British *Rubi*, very valuable in connexion with his

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* I note these as I find them, not forgetful of the observations upon some of them in 'Cybele Britannica.'

Monograph published in the 'Botanical Gazette' (vol. ii. pp. 113, 147), numerous specimens have been laid in from it belonging to other families; and thus in the case of species likewise occurring in the northern counties, obtained from the Winch collection, we have been assisted a little step in the illustration of their geographical extension. Mr. Babington has also presented a large and important parcel, consisting chiefly of rare species, with many of the critical plants which so much occupy the attention of British botanists*. Especially for this addition to the collection, and also for the time and care which Mr. Babington has devoted to going through the Society's Herbarium in order to check the nomenclature, not a little of its value is due.

A few large and difficult genera yet remain to be worked up with reference to our present knowledge; these will probably be undertaken by competent botanists before long. The *Rubi* Mr. Babington has consented to label in accordance with the names to be adopted in his forthcoming Monograph of the British species.

With regard to the mode of arrangement adopted, the paper employed for mounting upon measures about 14½ by 9½ ins., too small, perhaps, but necessarily uniform with that of the Smithian Herbarium contained in the adjoining cabinet. The sheets are marked for ready reference near the right-hand bottom corner, with the number of the species in the 'London Catalogue of British Plants,' which we have made use of as a convenient index to the collection. The mounted specimens are placed in folded sheets of tinted card-board "genus-covers;" these are also numbered consecutively, corresponding to a second numbering (of the genera) in the bound and interleaved copy of the 'Catalogue' kept on one of the lower shelves. The covers slide into fixed partitions measuring about 6 inches in depth, over which the doors of the beautifully constructed cabinet closely shut. The marks suggested by Jos. Woods in his 'Tourist's Flora' are made use of to indicate in the 'Catalogue' the more or less perfect state of the specimens representing each species respectively. Care has been taken to have all the plants poisoned before being laid away.

It may not be out of place to add that, with a view to the further completion of the Society's great Indian Herbarium, the valuable collection formed in Java and Sumatra by the late

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* A second packet, since received from the same gentleman, contains a nearly complete set of his "*Rubi.*"

Dr. Horsfield, and recently presented to the Linnean Society by the East India Company, has been, within the past few weeks, poisoned, mounted, and arranged.

The species already described by Messrs. Bennett and Brown in the ‘Plantæ Javanicæ Rariores,’ and also to a considerable extent those of Professor Miquel in the ‘Flora Indiæ Batavæ,’ have been written up with their respective references. A number of the specimens have been labelled by Miquel himself. The collection is, at present, placed in a cabinet immediately adjoining that containing the Wallichian Herbarium, to which it may be regarded as supplementary.

On the *Rosa rubella* of Winch. By JOHN HOGG, Esq., F.R.S., F.L.S.

[Read Dec. 1st, 1859.]

ABOUT the summer of 1823, I discovered in a hedge on the south of the lane leading from Carlton to Norton, in the county of Durham, a rose which had so much of the general appearance of *Rosa spinosissima* that I then considered it to be a *variety* of that species,—only that it had *pink* flowers; I therefore named it, in my short ‘Catalogue of Plants’ which was published a few years afterwards in Brewster's ‘History of Stockton,’ as “*Rosa spinosissima*, var. flore *rubro*.” Many plants of that species were also growing near the same spot. Some years afterwards, at the request of Mr. Winch, I again made search for that rose, and after a lapse of some two or three years I rediscovered the plant in blossom, having *pink* flowers; I sent a specimen to Mr. Winch, and he informed me that it was *Rosa rubella*.

Two years ago the late Mr. Storey, of Newcastle-on-Tyne, an able botanist, who was engaged in making a more accurate list of the plants indigenous in the counties of Durham and Northumberland, asked me to forward him specimens both in flower and in fruit (in the autumn). In 1857 and 1858 I duly investigated that part of the lane where I remembered that the plant from which I sent Mr. Winch the specimen was growing, but I only found what I thought was the same plant, although not in flower, or in fruit, in either of those years.

In June, however, of this year I was extremely pleased to behold one of the same plants in blossom, bearing two flowers of a lovely blush, or *pink* colour, of which the dried specimen I now exhibit was one. The second flower I sent to Newcastle; and very near this bush, I found a second plant with three buds—not expanded—but evidently of the same rose, as the flower-buds were tinted at the ends, and in lines on the back of the folded petals with deep *pink*. The bud also exhibited is from this second shrub. I gathered all the flowers and buds, and thus I was unfortunately prevented from ascertaining this autumn the colour of the fruit.

One of the chief differences between the *R. spinosissima* and *R. rubella*, is that the fruit of the former, at first *red*, becomes when mature *black*, whilst that of the latter is said to continue *red* when ripe (see fig. 3. plate 2601, English Botany); this last is likewise distinguished by some botanists as being *pendulous*. Having last week examined the specimens of the *R. rubella* preserved in Mr. Winch's herbarium, I must say that the fruit there dried presents neither of these characters, but it is *black*, or purlish-black, and its stalk is straight, and by no means drooping or pendulous. I also noticed that my specimen was less set with glandular bristles on the flower-stalks than that of Mr. Winch's specimens; but the size and shape of the petals appeared much the same. Further, some of the leaflets, as in mine, have simple serratures, while others show a doubly serrated margin; and in both, the insides of the sepals are downy.

The flowers in my specimens when fresh were of a lovely pink, and in size are larger than the flowers of the *R. spinosissima*, with the petals more notched; but the colours of the flowers of *R. spinosissima* I have never seen other than *white*, or *yellowish-white*. My specimens seem, from the fewer bristles on the flower-stalks, to be rather intermediate between *R. spinosissima*, whose flower-stalks are *smooth*, and the *R. rubella* of Winch's herbarium. Compare also the figures in *plate* 187 and *plate* 2521 of the 'English Botany.'

I will leave for the consideration of those who are more familiar with the *Rosaceæ*, whether the *R. rubella* be really a *distinct* species.

MR. BENTHAM'S NOTE ON HOMALIUM.

In drawing up my synopsis of the genus *Homalium* (p. 38), I had unfortunately overlooked M. L. R. Tulasne's "Floræ Madagascariensis Fragmentum Alterum," in the 'Annales des Sciences Naturelles,' sér. 4, Botanique, vol. viii. p. 58, where five new species of *Blackwellia*, all from Madagascar, are described. I have not seen any specimens, so as to compare them with my own species; I can, therefore, now merely give here the list, with the affinities suggested by the perusal of the descriptions.

B. brachystylis (Tul. in Ann. Sc. Nat., sér. 4, vol. viii. p. 59), evidently closely allied to *B. axillaris*, Lam., or my *Homalium axillare*.

B. Thuarsiana (Tul. *l.c.* p. 60), evidently very near to *B. paniculata*, Lam., or *H. paniculatum*, Benth.

B. eriantha (Tul. *l.c.* p. 62) must also be closely allied to the same species.

B. micrantha, Bois. (Tul. *l.c.* p. 63), seems to differ in its slender racemes and smaller flowers with broader sepals and petals.

B. planiflora, Bois. (Tul. *l.c.* p. 64), probably differs still more in having the petals broader, longer, and more obtuse than the sepals.

G. B.

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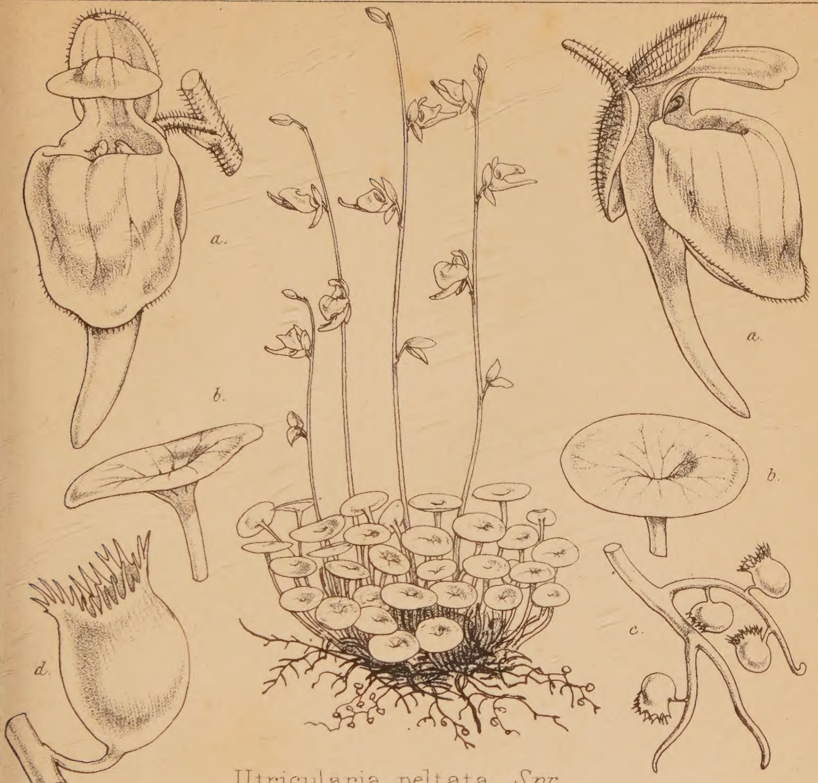

Utricularia peltata, *Spr.*